Policy-oriented National Priority Research Topics in Climate Change, Biodiversity, and Combating Desertification (2013-2020) with Guidelines, Procedures, Tools and Potential Funding Sources to Support their Implementation in the Hashemite Kingdome of Jordan

مواضيع الأبحاث الموجهة للسياسات ذات الأولوية الوطنية في مجالات

التغير المناخي، والتنوع البيولوجي، ومكافحة التصحر

(2013-2020)،

مع المبادئ التوجيهية والإجراءات والأدوات اللازمة والمصادر التمويلية الممكنة

لدعم تنفيذها في المملكة الاردنية الهاشمية

A Knowledge Product of

"Developing Policy-relevant Capacity for Implementation of the Global Environmental Conventions in Jordan"

"The CB-2 Project"

February 2013

MINISTRY OF ENVIRONMENT

gef

UNDP

Empowered lives.
Resilient nations.

The Hashemite Kingdom of Jordan

The Deposit Number at the National Library

(2013/2/466)

Policy-oriented National Priority Research Topics in Climate Change, Biodiversity, and Combating Desertification (2013-2020) with Guidelines, Procedures, Tools and Potential Funding Sources to Support their Implementation in the Hashemite Kingdome of Jordan

مواضيع الأبحاث الموجهة للسياسات ذات الأولوية الوطنية في مجالات التغير المناخي، والتنوع البيولوجي، ومكافحة التصحر (2013-2020)، مع المبادئ التوجيهية والإجراءات والأدوات اللازمة والمصادر التمويلية الممكنة لدعم تنفيذها في المملكة الاردنية الهاشمية

A Knowledge Product of

"Developing Policy-relevant Capacity for Implementation of the Global Environmental Conventions in Jordan"

"The CB-2 Project"

February 2013

MINISTRY OF ENVIRONMENT

gef

UNDP

Empowered lives.
Resilient nations.

Forward

Definitely good research would lead to better policy. We, as policy makers, had to admit that research findings did not always reach to policy makers. The fact of the research findings being "left behind" was a common recreation in arenas of decision making. We believe many reasons behind such phenomenon, such as, but not limited to, lack of institutionalized communication mechanism between the two parties, lack of exposure of policymakers to new research findings and weak vperception of policymakers of the importance of the research let alone the researchers themselves are not delivering research findings to policy makers in an institutionalized and sustainable mechanism, if any.

Maybe for the first time in the history of the governmental environmental work in Jordan, policy-oriented national priority research topics of major environmental areas, such as those of Climate Change, Combating Desertification, and Biodiversity, (the topics of the three Rio Conventions) are systematically determined, prioritized by involved policy makers (and some researchers of policy making experience), and disseminated to research communities. Such bouquet of research priorities extracted in this study came as a result of an organized process of situation analyses of conventions' obligations and provision; research initiatives undertaken to fulfill such research needs, if any; required research to fill gaps, policy gaps, and potential finial opportunities to sponsor such research priorities.

The three Rio Conventions - United Nations Convention on Biodiversity, (CBD), United Nations Framework Convention on Climate Change, (UNFCCC) and United Nations Convention on Combating Desertification, (UNCCD), which form an intricate triangle for environmental management that responds to the real challenges facing the global environment, lie at the heart of the global environmental governance system which ultimately aims at achieving sustainable development. Promoting and developing policy-oriented research relevant to the obligations and provisions of such conventions, to which Jordan is a signatory, is aiming at bridging research and policy in this regard. Coming from the policy making arena as the Secretary General of Jordan Ministry of Environment (MoEnv), I strongly believe that better utilization of research and evidence in policy and practice can help solve the overwhelming majority of environmental problems; accelerate economic growth; reduce poverty and improve livelihoods. Having the scale of the challenges in the country in mind, policy-research bridging issue matters most for a developing country like Jordan.

Agenda 21**,** the most global comprehensive planning document for sustainable development in human history, which sets foundations for global strategy for sustainable development, focused in Chapter 31, entitled: "***SCIENTIFIC AND TECHNOLOGICAL COMMUNITY"***, on how to enable the scientific and technological community, which includes, among others, scientists, engineers, architects, industrial designers, urban planners and other professionals and policy makers, to make a more open and effective contribution to the decision-making processes concerning environment and development. "*It is important that the role of science and technology in human affairs be more widely known and better understood, both by decision makers who help determine public policy and by the general public*…" stated in the said document in the Chapter. Improved communication and cooperation between the scientific and technological community and decision makers will facilitate greater use of scientific and technical information and knowledge in policies and programme implementation. Decision makers should create more favorable conditions for improving training and independent research in sustainable development. Existing multidisciplinary approaches will have to be strengthened and more interdisciplinary studies developed between the scientific and technological community and policy makers and with the general public to provide leadership and practical know-how to the concept of sustainable development.

To institutionalize such elegant principles, a project was executed by MoEnv (from November 2009-February 2013) titled "*Developing Policy-relevant Capacity for Implementation of the Global Environmental Conventions in Jordan*", or shortly "**the CB-2 Project**", sponsored by Global Environment Facility (GEF) and partially by MoEnv, and administrated by United Nations Development Programme (UNDP)-Jordan. The Project's long-term goal is to develop the policy and legal frameworks in Jordan to strengthen compliance with global environment

conventions. The project main objective was to develop policy-relevant capacities for the implementation of the global environmental conventions, by enhancing connectivity between the research and policy making for optimum global environmental management. To achieve this, the project targeted relevant ministries, research entities at NGOs, and national research and education institutions and developed necessary knowledge base of focus groups of representative researchers (members of the three Rio National Committees in Jordan: the *National Committee on Climate Change*; the *National Committee on Combating Desertification*; and the National *Committee on Biodiversity* as well as members of the three thematic research groups of the Committees (*Climate Change Research Group; Combating Desertification Research Grou*p; and the *Biodiversity Research Group*). The project adopted an approach for mainstreaming and capitalizing upon existing national initiatives already engaged in the application of policies and laws through applied research, to therefore ensure that the continuity of any enforcement measures of policies and laws will be based on nationally tested and demonstrated systems and approaches. The project idea has been generated as a result of highly consultative process of National Capacity Self Assessment (NCSA) for global environmental management, the mother project.

Developing the capacities for targeted and policy oriented research in the thematic areas of global environmental management has been identified as a key priority by the NCSA, and many other relevant assessments and studies. Support to research is an apparent national priority in the context of sustainable development. Therefore, by being rooted into the national priority agenda and current reform processes, the CB-2 Project ensured sustainability of its results. Critical element of the project strategy is to link up with the key programmes and processes currently underway that will help to anchor and uptake main deliverables of the project. This knowledge product of the CB-2 Project is uniquely significant since it presents not only the Policy-oriented National Priority Research Topics in Climate Change, Biodiversity, and Combating Desertification (2013-2020) but also supportive guidelines, procedures, and tools to foster their implementation, and most importantly it lists potential funding sources for such research topics. This one step is the beginning on the road of bridging environmental research and policy.

The key questions remain are: how can policy-makers best use research findings of such priority subjects and move towards evidence-based policy-making in Jordan? How can researchers best use their findings in order to influence policy? And how can the interaction between researchers and policy-makers be improved? We hope such questions will be in turn the subject of other policy-research bridging initiatives. We emphasize that we are still not providing answers to such questions at this stage of the bridge building, but brainstorming solutions to the problem to draw together the outline of required mechanisms and up-grad the already developed coordination and collaboration mechanism at MoEnv between policy makers and research institutions (the ***Three Rio National Committees*** and their ***Thematic Research Groups***). A study like this one opens many avenues for further research. If this study is replicated, it would provide the opportunity to answer many more questions.

Eng. Ahmad Al-Qatarneh
Secretary General,
Ministry of
Environment
February 2013

Acknowledgment

This consultancy assignment knowledge product would never have been possible without effective participation and sincere cooperation and support of many friends, colleagues and national officials at Global Environment Facility (GEF); United Nations Development Programme (UNDP)-Jordan, Jordan Ministry of Environment (MoEnv), and other ministries, NGOs, and academic and research institutions involved in the activities of "*Developing Policy-relevant Capacity for Implementation of the Global Environmental Conventions in Jordan*" or shortly "***the CB-2 Project***." The assistance provided to the success of the Project and this knowledge product particularly was both spiritual and material of innumerable people, some of whom must unfortunately go unnamed here.

We, the CB-2 Project management team:

Dr. Ahmad Nafiz Abdel-Fattah, Project Manager, and

Mrs. Ghada Als-Sous, Project Assistant

must begin by thanking the high-rank staff at UNDP-Jordan for selecting us, Ghada Als-Sous, for the position of "Project Assistant" who, as I always saw it, being the Project Manager and writer of this acknowledgement, really an asset and the key success factor to the Project who always had been a real motivator of the team, and for selecting myself, for the position of "National Project Manager" of the CB-2 Project. We want to thank also all colleagues at UNDP-Jordan for their administrative and complimentary support, which all together enabled us to execute successfully this challenging Project that we personally enjoyed a lot and achieved many good results; one of them is this knowledge product, as a team.

Here, we would like to thank specifically Maha Al-Zubi and Mohammad Alatoom, respectively ex- and current *Environment Programme Analyst/Head of Environment & Climate Change Portfolio* at UNDP-Jordan, the officials in charge of the CB-2 Project, who never stopped supporting us and their question about the "*added value"* behind any of our endeavors was a motivator to excel in any activity we performed.

Second, we wish to express our utmost appreciation to many colleagues at Jordan MoEnv for being good implementing partners and for encouraging us in all of our endeavors especially at the very crucial junctures. We mention specifically herewith: H.E. Secretary General, Eng. Ahmad Al-Qatarneh, for never ending administrative and most importantly, complimentary and spiritual support; Eng. Hussein Shahin; Mohammad Al-Alem; Eng. Samir Al-Kilani; Mohammad Afaneh; Eng. Faraj Al-Talib; Eng. Raed Bani Hani; Eng. Ahmad Abbas; Eng. Indira Dahabi, Basel Al- Qudah, and finally Eng. Hussein Badarin. We are profoundly grateful to them and friends at other ministries, particularly Engs. Awwad Harahsheh and Ziad Obeidat from MoPIC, for helping us keep this Project on track and Mrs. Nawal Hawedi from MOSD, who provided moral and emotional support that give us a push forward.

Here as well, special thanks go to our greatest supporter and best friend, Batir Wardam, for being a real support of all of our activities and who used to read the entire manuscripts of our write-ups, sometimes very long, and made detailed comments, who deserves special mention —many thanks Batir; to Dr. Munjed Al-Sharif who also read our works and provided insight and also to his project assistance, Mrs. Rana Saleh for providing assistance and support from time to time; to Dr. Nedal Alouran, who we used to refugee to during hard moments of the Project, and many other colleagues who provided both help and encouragement along the way.

Finally, warm thanks are extended to all partners and stakeholders who took time to contribute particularly the members of the three Rio National Committees in Jordan (the National Committee on Climate Change; the National Committee on Biodiversity, and the National Committee on Combating Desertification) as well as their three thematic research groups (Climate Change Research Group; Biodiversity Research Group; and Combating Desertification Research Group) and to all those not named here whose good will and encouragement nevertheless made a difference in helping this knowledge product come into being, our sincere gratitude.

February 2013

"Policy-oriented National Priority Research Topics in Climate Change, Biodiversity, and Combating Desertification (2013-2020) with Guidelines, Procedures, and Tools to Support their Implementation"

Edited by: **Dr. Ahmad Abdel-Fattah**,
UNDP-Jordan and Jordan Ministry of Environment

Prepared by:
Science Triangle for Research, Training and Management, Amman-Jordan, 2012

Consultancy assignment team and authors:

1. **Dr. Mohammad Al-Qinna**, the Climate Change component expert of the assignment
   Department of Land Management and Environment
   Faculty of Natural Resources and Environment
   The Hashemite University
   Jordan
2. **Dr. Sabah Saifan,** the Biodiversity component expert of the assignment
   Head of Plant Genetic Resources Unit
   National Centre for Agricultural Research and Extension (NCARE)
   Jordan
3. **Dr. Jawad Al-Bakri**, the Desertification component expert of the assignment
   Department of Land, Water & Environment.
   Faculty of Agriculture
   University of Jordan
   Jordan
4. **Dr. Brian Boman,** International Research and Policy Expert
   Agricultural & Biological Engineering Department
   University of Florida
   United States of America
5. **Dr. Clyde Fraisse,** International Research and Policy Expert
   Agricultural & Biological Engineering Department
   University of Florida
   United States of America
6. **Dr. George Hazboun**, Policy and Law Expert, Lawyer, and President,
   The American University of Madaba
   Jordan
7. **Dr. Ayman Suleiman**, Consultancy Assignment Team Leader
   Department of Land, Water & Environment
   Faculty of Agriculture
   University of Jordan
   Jordan

Table of Contents

List of Figures

List of Tables

List of Abbreviations

ABS	Access and Benefit-Sharing
AHTEG	Ad hoc Technical Expert Group
BCH	Biosafety Clearing-House
BRP	Badia Restoration Program
CBD	Convention of Biological Diversity
CDM	Clean Development Mechanism
CITES	Convention on International Trade in Endangered Species
COP	Conference of the Parties
CRIC	Committee for the Review of the Implementation of the Convention
CST	Committee on Science and Technology
DLDD	Desertification, Land Degradation, and Drought
DNA	Designated National Authority
EU	European Union
FAO	Food and Agriculture Organization
FFP	Food, Feed and Processing
GEF	Global Environment Facility
GHG	Greenhouse Gases
GISP	Global Invasive Species Program
GTZ	German Agency for Technical Cooperation
HCST	Higher Council of Science & Technology
HTPI	Handling, Transport, Packaging and Identification
IDRC	International Development Research Centre
IFAD	International Funding for Agricultural Development
IFS	Integrated Financing Mechanism
INCD	Intergovernmental Negotiating Committee
IPF	Intergovernmental Panel on Forests
IRM	Integrated Resources Management
ISSG	Invasive Species Specialist Group
IUCN	International Union for the Conservation of Nature
KP	Kyoto Protocol
LADA	Land Degradation Assessment in Dry lands
LMOs	Living Modified Organisms
M&A	Monitoring and Assessment
MA	Millennium Ecosystem Assessment
MEMER	Ministry of Energy and Mineral Resources
MENA	Middle East and North Africa
MOA	Ministry of Agriculture
MoEnv	Ministry of Environment
MoESR	Ministry of Higher Education and Scientific Research

MOSD	Ministry of Social Development
MSS	Marine Science Station
MWI	Ministry of Water and Irrigation
NAP	National Strategy and Action Plan
NATO-SfP	North Atlantic Treaty Organization - Science for Peace
NBSAP	National Biodiversity Strategy and Action Plan
NCARE	National Center for Agriculture Research and Extension
NCSA	National Capacity Self Assessment
NSMLUP	National Soil Map and Land Use Project
OIE	World Organization for Animal Health
PACD	Plan of Action to Combat Desertification
PoWPA	CBD Program of Work on Protected Areas
RSCN	Royal Society for the Conservation of Nature
SBSTTA	Subsidiary Body on Scientific, Technical and Technological Advice
SLM	Sustainable Land Management
TRG	Thematic Research Group
UNCCD	United Nation Convention to Combat Desertification
UNCED	United Nations Conference on Environment and Development
UNCOD	United Nations Conference on Desertification
UNDP	United Nations Development Program
UNFCCC	United Nations Framework Convention on Climate Change
WFP	World Food Program

Executive Summary

The National Capacity Self Assessment (NCSA) process in Jordan, in 2007, examined the country's priorities and took an honest assessment of past achievements and options for improvement. The NCSA indicated that the existing research capacities in environmental and natural sciences do not adequately address the global environmental issues in the areas of biodiversity, combating desertification and climate change, the core thematic areas of Rio Conventions. Furthermore, the NCSA report highlighted the disconnection between the scientific community and the policy making community, which is one of the major constraints for implementing the Rio Conventions. Therefore, environmental policy decisions are often not based on sound research and do not have scientific justifications for action. Consequently, the "Developing Policy-Relevant Capacity for Implementation of the Global Environmental Conventions in Jordan" or shortly the "CB-2 Project" was proposed with the aim of building the national capacity for the implementation of the Global Environmental Conventions in Jordan. The goals of this consultancy, as derived from the CB-2 project, are to identify research priorities and develop guidelines, tools and procedures to promote policy-oriented research, and to identify potential funding mechanisms to promote policy oriented research (with emphasis on international funding sources).

The implementation of the three Rio Conventions is likely to address many issues that were grouped in this consultancy into seven categories: public participation; technology transfer and cooperation; financial mechanisms; legislation formulation and enforcement; research areas; and monitoring and evaluation. The most important provisions and obligations of the three Rio Conventions on Jordan have been identified in this consultancy. Jordan is a non-Annex I party to United Nations Framework Convention on Climate Change, UNFCCC, and presently there are only two main obligations for the Kingdom. The obligations states that all parties should 1) Provide "a national inventory of anthropogenic emissions" and 2) Promote and facilitate the development and implementation of educational and public awareness programs on climate change.

The immediate obligation from United Nations Convention to Combat Desertification, UNCCD, is the preparation of national action plan (NAP) to combat desertification. This obligation has already been accomplished by Jordan, which launched desertification NAP in 2006. However, the ninth session of the Conference of the Parties, COPs, in Buenos Aires in 2009 called for enhancing the implementation of the Convention with a proposed 10-year strategic plan (2008-2018). This should stimulate the country's efforts in conducting policy-oriented research in the areas related to the objectives of the strategic plan, particularly the area of identifying benchmarks and indicators for combating desertification.

The Convention on Biological Diversity, CBD, urges parties to develop their national biodiversity strategies, plans or programs, and to integrate the objectives of the convention into relevant sectoral or cross-sectoral plans, programs and policies. It also ask parties to address both in-situ and ex-situ conservation, but more emphasis is given to in-situ measures where the evolution process maintained for species.

The climate change themes for environmental policies, strategies, and action plans are still vague. In some cases, the climate change themes were either linked with drought or desertification assessment. Climate change research in Jordan suffers from underfunding, lack of data and facilities, and the lack of national policies among relevant Ministries in this particular area of Rio Conventions. Raising the profile of climate change research on the national agenda requires bringing policy makers closer to the research community, and bringing mainstream provisions of UNFCCC into national policy. This can be accomplished by including the Convention's objectives and principles in national or sectoral development planning by community groups, government departments, organizations, universities and businesses. The goal will be to develop a blueprint for action and change.

Many research and research projects have been carried out on desertification and arid land resources and their environments in Jordan. The main areas of research related to UNCCD have been soil degradation, conservation and management; rangeland resources degradation and restoration; indicators for monitoring drought and land degradation; water resources use and management; water harvesting; traditional knowledge; socioeconomics dimensions of desertification; land use and land cover changes; and climate change. During the

past decade, the main focus of biodiversity research has been conservation and diversity assessment of species using various techniques. In recent years, and in response to the environmental challenges of desertification and climate change, a slight shift toward conducting studies of sustainable utilization of biodiversity components has happened. Despite the important results obtained by biodiversity research carried out in Jordan, there exists a weak and fragile connection between scientific community and policy-making community. Research activities and results of research are not linked to the process of policy development or to the general public. In addition, there are several biodiversity convention themes that are still not being addressed and promoted by research activities.

Policy-oriented research areas for the Rio Conventions' themes were identified from UNFCCC1, UNCCD, CBD, COPs and the Committee for the Review of the Implementation of the Convention, CRICs, and other relevant documents. Priority research areas were also identified and scored for priority by the stakeholder evaluation analyses process. The key stakeholders participated included ministries, universities, national centers, NGOs, and the three thematic research groups of climate change, biodiversity, and combating desertification. In order to have a legitimate evaluation of all suggested research areas in each of the three Rio thematic groups, a prioritization scheme was developed. The prioritization criteria were developed by the team and presented to the stakeholders for feedback. According to the stakeholders' evaluation for the suggested research areas in the field of climate change, results indicated that "impact, vulnerability and adaptation" research themes are considered the first research priorities. This result agrees with the findings of NCSA report through which low capacity for developing national vulnerability studies and adaptation measures and plans is considered the first constraint of implementation of climate change research in Jordan. At the same time, this result is considered of vital importance to the Ministry of Environment, MoEnv, to start adopting National Adaptation Programmes of Action, NAPAs, that is a major obligatory focus of the COPs up to date.

The stakeholders' evaluation results for research priorities in the area of desertification showed that research related to the area of "water management and its roles in combating desertification" has the highest priority. The evaluation results showed that policy-oriented research areas related to "developing national genetic resources strategy and regulations" got the highest score possible while "monitoring, measuring and evaluating the impact of climate change and desertification on biodiversity" are of the second highest priority. Also developing legislation and regulations and management of the biodiversity are important areas and of high research priority. The climate change, agricultural biodiversity, mountain biodiversity, protected areas and fragile habitat and vulnerability were highly ranked research priorities, which reflect the needs of NCSA.

Different research tools, procedures, guidelines can be used to support the implementation of such research priorities. These include models, methods, activities, instruments, and devices used to facilitate implementing the sought policy-oriented research. These were extracted and obtained from the latest developments in applied climate change, desertification and biodiversity disciplines to help scientists carry out such investigations and research works. The updated reports of the Subsidiary Body for Scientific and Technological Advice, SBSTA for the climate change were reviewed, reflected upon and integrated to the activities, procedures, methods, and tools of developing policy-oriented research. According to research areas allocated for climate change theme, the main tools that are useful for any institutional/NGO/Private sector researcher were documented. The different UNCCD, COPs, and Committee on Science and Technology, CST, sessions focused on the use of different tools for drought monitoring and for early warning systems. Among these tools are the biophysical ones which are usually implemented for mapping the potential for soil erosion by wind and water. Other models are based on remote sensing data and are usually applied to assess droughts and vegetation conditions. The UNCCD and COPs emphasized the roles of economic models for decision making. The tools for policy-oriented research were proposed according to the biodiversity research thematic areas that were proposed and updated by the SBSTA

[1] The original work submitted by the consultant in February 2012 included only potential climate change research areas extracted from the provisions and obligations in the UNFCCC. However, after developing a National Climate Change Policy for Jordan for the first time in February 2013, the CB-2 Project manager integrated in this work potential climate change research areas extracted from the provisions of the Policy

for the Biodiversity theme. The tools help researchers and biodiversity stakeholders to accomplish the policy-oriented research.

Numerous opportunities for funding from international sources for the three Rio Conventions' thematic areas were documented in this consultancy. There are often many stipulations on funds that are available. The types of funding available from various agencies, institutions, foundations, and trusts were documented as well. Subject areas, funding cycles, application deadlines, and proposal guidelines change frequently, so interested parties are encouraged to check frequently for these and additional opportunities. There are several websites that collate and list potential sources of funding.

The linkages between climate change, desertification and biodiversity are many, complex and varied. It is well recognized that the main objectives of these agreements are well interrelated as climate change can affect desertification and biodiversity due to increased occurrence of extreme events such as droughts and floods and shifts in the distribution of temperature and precipitation. Desertification in turn, affects biodiversity by reducing the diversity of vegetation cover and soil microbial species leading to reduced soil conservation and soil erosion. Consequent reduction of carbon stocks and above and below ground sequestration together with land use changes can lead to further climatic change. Synergies among the three Rio Conventions policy-oriented research areas were suggested.

The establishment of gender equality is a necessary condition for human development. It is also a fundamental objective in the fight against poverty. Women and men play different roles and have different responsibilities in their families, communities, and societies. Understanding these differences is vital when developing policies, programs and projects meant to improve people's livelihoods. In research programs gender mainstreaming can refer to the way in which policy-oriented research incorporate gender perspectives so that the overall research framework, approach, methodologies and tools employed to conduct the research are clearly gender sensitive. The gender-sensitive research can be only done through taking gender into account at all stages of the research cycle namely research idea phase, research proposal phase, research phase and dissemination phase.

There is no exact framework used to derive policy-oriented research. However, a framework was suggested in this consultancy to improve government decision making through providing a robust framework of guidelines, procedures, and tools for promoting and supporting policy-oriented environmental research on topics of national priorities on the themes and obligations of the three Rio Conventions. In order to have efficient procedures that save time and deliver outputs for decision making, it is important either to develop a new directorate or division within the MoEnv under the theme "National Environmental Research Fund" or to upgrade existing ones. The national Thematic Research Groups (TRGs) and the National (steering) Committees for Rio Conventions should form part of the proposed Research Fund. Also, they should operate under the umbrella of the Environment Protection Fund, which in turn, needs revision of its regulations (2009) to introduce a framework for providing financial and technical support for research in the areas of environment protection and, in particular, the three Rio Conventions. Furthermore, a mechanism for mobilizing financial resources from national and international sources should be considered by this proposed Fund.

Summary in Arabic ملخص بالعربية

تهدف هذه الدراسة إلى تحديد الأولويات البحثية وتطوير مجموعة من الإرشادات، والإجراءات، والأدوات للمساهمة في تعزيز دور البحوث الموجهة لصنع السياسات المرتبطة بإتفاقيات ريو البيئية العالمية الثلاث: التنوع الحيوي، ومكافحة التصحر، والتغير المناخي. وتساهم الدراسة في الجهود الوطنية لتضييق الفجوة بين صنع القرار ومخرجات البحث العلمي. وتمثل الدراسة مخرجاً مهما لمشروع بناء القدرات – المرحلة الثانية (CB-2)، والذي يعتبر ثمرة من ثمار مشروع دعم وتقييم القدرات الوطنية (NCSA) في الاردن ، عام 2007، والذي أشار إلى أن النشاطات البحثية لا تعالج الموضوعات المرتبطة بمجالات اتفاقيات ريو الثلاث.

وقد قامت منهجية االدراسة على تحليل الالتزامات المترتبة على توقيع الاتفاقيات الثلاث2، وما تلاها من مؤتمرات وبروتوكولات، وبتحليل الفجوات التشريعية اللازمة كإطار قانوني للتنفيذ على المستوى المحلي. كذلك قامت الدراسة بتحديد مجالات البحث اللازمة لتوجيه السياسات باتجاه تنفيذ الاتفاقيات الثلاث، مع الاستعانة بارآء خبراء المجموعات البحثية المختصة في هذه المجالات لترتيب الأولويات البحثية لتحقيق الفائدة المنشودة من هذه الاتفاقيات، فقد قامت الدراسة بتحديد المواضيع ابحثية ذات الولوية وبتلخيص الإرشادات، والإجراءات، والأدوات الازمة لكل مجال بحثي مرتبط بالاتفاقيات الثلاث، مع تحديد وسائل دمج النوع (تعزيز دور المرأة) ، والمجالات البحثية المشتركة (التآزر) ضمن هذه الاتفاقيات، والجهات المحتملة لتمويل المجالات البحثية .

أشارت نتائج تحليل الدراسة إلى أن اتفاقيات ريو الثلاث ترتبط بالعديد من القضايا، و التي تم تصنيفها إلى سبع فئات: المشاركة العامة، ونقل التكنولوجيا والتعاون، وآليات مالية؛ وصياغة التشريعات والإنفاذ؛ ومجالات البحث، والرصد والتقييم. وقد تم تحديد أهم الأحكام والالتزامات المنصوص عليها في اتفاقيات ريو الثلاث في الأردن في هذه الاستشارة.

تتلخص الالتزامات الرئيسة على المملكة في مجالات اتفاقية التغير المناخي في محورين أساسيين هما: 1) تزويد"قائمة جرد وطنية للانبعاثات ومصادرها" و 2) تشجيع وتسهيل تنفيذ برامج التعليم والتوعية العامة بشأن التغير المناخ. وبالنسبة للالتزامات الجديدة لاتفاقية التصحر فهي مرتكزة على توصيات الدورة التاسعة لمؤتمر الأطراف في بوينس آيرس في عام 2009، والتي دعت لتعزيز تنفيذ الاتفاقية مع خطة عمل عشرية (2008-2018). أما اتفاقية التنوع الحيوي ، فهي تحث الأطراف على وضع استراتيجية وطنية للتنوع الحيوي، وخطط أو برامج، ودمج أهداف الاتفاقية في الخطط القطاعية، وغير القطاعية، والبرامج والسياسات. كذلك تحث هذه الاتفاقية الدول الموقعة على حفظ الأجناس داخل أوخارج موائلها.

أشارت نتائج تحليل المعطيات إلى افتقار المملكة للسياسات الوطنية التي تعطي الأولوية للمجالات البحثية في مجال التغير المناخي، مع ضعف التعاون بين صانعي السياسة والمؤسسات العلمية. أما في مجالات اتفاقية التصحر، فقد أجريت العديد من البحوث والمشاريع البحثية والتنموية في مجالات تنمية موارد الأراضي الجافة ، وتطوير المراعي ، والحصاد المائي، فيما تركزت أبحاث التنوع الحيوي على حفظ واستخدام الأجناس النباتية ، فيما لا زال هناك العديد من موضوعات اتفاقية التنوع الحيوي التي لم يتم دراستها بالشكل المطلوب.

أظهرت نتائج التقييم من قبل شركاء المشروع وخصوصاً أعضاء المجموعات البحثية المتخصصة أن البحوث المتعلقة بمجال " إدارة المياه ودورها في مكافحة التصحر" كان لها الأولوية العليا بين المجالات البحثية في مجال مكافحة التصحر، بينما كانت الأولوية العليا للبحث في مجالات التغير المناخي متعلقة بتقييم أثر هذه الظاهرة على القطاعات المختلفة ، خصوصاً قطاعي الزراعة (والذي أحتل بشكل غير متوقع المرتبة الأولى) والمياه الذي إحتل المرتبة الثانية، ووسائل التكيف والتأقلم المطلوبة. اما بالنسبة لمجالات البحث في موضوع التنوع الحيوي فقد كانت الأولوية لموضوع تطوير الإستراتيجيات والتشريعات والأنظمة الوطنية الخاصة بالأصول الوراثية وإدارة المناطق الهامة والنقاط الساخنة للتنوع الحيوي. كذلك فإن رصد وقياس وتقييم أثر تغير المناخ والتصحر على التنوع الحيوي هي من المجالات ذات الأولوية. ، فيما يعتبر تغير المناخ والتنوع الحيوي الزراعي، والتنوع الحيوي للجبال، والمناطق المحمية والموائل الهشة وتصنيف وتطوير قاعدة بيانات للأنواع من أولويات البحث التي تعكس احتياجات الاستراتيجية الوطنية في هذا المجال.

شملت مخرجات الدراسة إرشادات للباحثين في هذه المجالات لاتباعها عند تنفيذ البحوث الموجهة لصنع السياسات في مجالات اتفاقيات ريو. كذلك تم اقتراح الأدوات الرئيسة للبحث في مجال تغير المناخ والتي تشمل النماذج الرقمية لتقييم الآثار والتغيرات المناخية، والانبعاثات الغازية ، وأساليب المعالجة. أما أدوات البحث في مجال مكافحة التصحر فتشمل استخدام التقنيات الحديثة من وسائل الاستشعار عن بعد ونظم المعلومات الجغرافية، والنماذج الرقمية، والشبكات، والمسوحات الميدانية لمراقبة الجفاف والإنذار المبكر لوقوعه. وبشكل مشابه، فقد شملت أدوات البحث في مجالات التنوع الحيوي النماذج الرقمية والمؤشرات الحيوية، والمسوحات الميدانية، بالاضافة لتكنولوجيا الهندسة الوراثية والبروتوكولات المعروفة عالمياً في هذا المجال.

لخصت الدراسة الفرص والمصادر التمويلية المحلية والدولية المتاحة لدعم البحوث الموجهة لصنع السياسات في اتفاقيات ريو الثلاث. وقد تم توثيق أنواع التمويل المتاح من مختلف الوكالات والمؤسسات، مع حصر المناطق الخاضعة للتمويل، و دورات التمويل، والارشادات التوجيهية،

[2] الدراسة الأصلية التي قدمت للمشروع من الفريق الإستشاري بتاريخ فبراير 2012 إشتملت، فيما يتعلق بالتغير المناخي،فقط على تحليل إتفاقية الامم المتحدة الإطارية للتغير المناخي لإستخراج الاولويات البحثية ولكن بعد إعداد مسودة لسياسة التغير المناخي للمملكة الاردنية الهاشمية من قبل المشروع في فبراير 2013، قام مدير مشروع ال CB-2 بإستخراج المواضيع البحثية الممكنة من مسودة السياسة ودمجها في هذه الدراسة.

والمواقع الإلكترونية على الشبكة العنكبوتية، والتي تتيح للباحثين الحصول على مصادر تمويلية مناسبة لإجراء البحوث المنشودة. كذلك قامت الدراسة باقتراح اجراءات ارشادية لوزراة البيئة لتطوير صندوق حماية البيئة ليصبح مظلةً تمويلية لمثل هذه المشاريع.

أشارت الدراسة إلى وجود روابط قوية وتآزر بين تغير المناخ ، والتصحر، والتنوع الحيوي. فالتغير المناخي يؤثرعلى التصحر والتنوع الحيوي من خلال الجفاف والفيضانات والتحولات في توزيع درجات الحرارة والأمطار، فيما يؤدي التصحر إلى تراجع التنوع الحيوي من خلال انجراف التربة وفقدان خصوبتها. وينتج عن هذه التغيرات انخفاض مخزونات الكربون في التربة واطلاقها للغلاف الجوي، مع الآثار السلبية على وظائف النظام الحيوي وفقدان موارد الدخل للمجتمعات المعتمدة على هذه الأنظمة، لا سيما المجتمعات الريفية. وعليه تعتبر منطقة البحث المشتركة بين مجالات هذه الاتفاقيات هي تثبيت كربون التربة وتقليل الانجراف، مع ربط المخرجات البحثية بالفقر والأمن الغذائي والاجتماعي.

حثت الدراسة الباحثين وصانعي القرار على إدخال مفهوم النوع (المساواة بين الجنسين) كشرط أساسي لتحقيق التنمية المرجوة من البحث العلمي. وعليه، فقد اقترحت الدراسة أساليب وتوصيات لدمج النوع الاجتماعي في البحوث المتعلقة بمجالات اتفاقيات ريو؛ بحيث يمكن تعظيم الفائدة المرجوة من البحث من خلال دمج النوع الاجتماعي في مراحل كتابة وتنفيذ البحث.

خلصت الدراسة إلى امكانية تطوير إطار متكامل نحو سياسة موجهة للبحث العلمي في مجال اتفاقيات ريو، إذا ما تم مراعاة وتطبيق ما جاء في نتائجها. ويشمل الإطارتحسين صنع القرار الحكومي من خلال المبادئ التوجيهية والإجراءات والأدوات اللازمة لتعزيز ودعم البحوث الموجهة نحو السياسات البيئية في مجالات اتفاقيات ريو الثلاث. ومن أجل الحصول على إجراءات فاعلة لتوفير الوقت وتحقيق نتائج قيمة لاتخاذ القرار، فمن المهم القيام بتطوير مديرية جديدة أو قسم في وزارة البيئة تحت شعار "الصندوق الوطني للبحوث البيئية" ، على أن تكون المجموعت البحثية واللجان الوطنية للاتفاقيات الثلاث جزءا من هذا الصندوق. كذلك توصي الدراسة بإعادة النظر في آلية الحصول على موارد مالية من المصادر الوطنية والدولية لتفعيل عمل الصندوق المقترح لدعم الباحثين.

1. Introduction

The debate on the linkages between research and policy/decision-making processes is not new and its features have changed over time. However, the issue has gained greater prominence in recent years following the increasing call for concrete evidence to support environmental policies and decisions. Policy and research should be collaborative and mutually dependent partners, uniting many different disciplines. In Jordan, the implementation of the three Rio Conventions (United Nations Framework Convention on Climate Change or UNFCCC; United Nations Convention on Biological Diversity or CBD; and United Nations Convention on Combating Desertification or UNCCD) lacks sufficient connections between research and policy making, despite universal calls for collaboration in order to achieve goals of these conventions at global and national scales. In recent years, the need to strengthen the implementation process by linking policy with research and practice has becoming increasingly apparent. It has been manifested by calls to create synergism and collaboration in addition to including research functions in the policy making process.

Research is an important component in the policy making process. High-quality, policy-oriented research can improve public policy and have significance on the efforts aiming at conserving natural resources. This can be attained through an increased utilization of research results in evidence-based policy making, and vice-versa. Adoption of policy-oriented research begins with joint formulation of research topics in consultation with the line ministries. However, selection and formulation of the design and the conclusions of the research are entirely independent. They do not necessarily reflect the views of the ministries involved or any other government agency. With regard to natural resources, policy-oriented research is focused on explaining and understanding threats to these resources and to evaluate possible solutions to these threats and challenges. The outputs of such type of research should be conveyed in an appropriate format to policy and decision making institutions.

Research can determine the facts for the policy makers. Ultimately, these facts should shape and determine the decisions. Research also has an important role to inform policy makers on the actual impact of policies being considered for adoption. There are three distinct stages that have been identified within the policy development process where research has a role: 1) formulation, 2) implementation, and 3) accountability. However, research findings can only be used as an input to policies if researchers and policy-makers cooperate closely to understand specific needs, ensure relevance of topics, and improve communication, dissemination and implementation of the research recommendations. The role of the research institutions is fundamental for the effective implementation of national strategies and action plans pertinent to the three Rio Conventions. These institutions can provide technical and scientific information that should be the basis for policy adoption and decision-making. Thus, such institutions should participate in the different phases of the implementation process of these strategies and actions plans.

This document builds on the country's effort to implement the three Rio Conventions by providing potential research areas of national priorities as well as policy-oriented research guidelines, procedures and tools to implement such research priorities. These will enable the focal point of the Conventions (Ministry of Environment) and the relevant institutions and stakeholders a mechanism to coordinate the efforts of researchers and research institutions to conduct the necessary research related to the three Conventions that will form the basis of decision-making pertinent to environment protection. The document summarizes the legal status of the three Rio Conventions and the related provisions and actions needed by the country to fulfill its commitments towards implementation. Prioritized key research areas are also included to provide institutions and researchers with a place to begin in the quest to achieve research-based policy to accommodate the implementation of the Rio Conventions in Jordan. Also included are suggested research procedures and some of the tools available at this time.

This report provides the Rio Conventions-related policy-oriented research priorities, research guidelines, procedures, and tools to support the implementation of the Rio Conventions, as a deliverable of the "Developing Policy-Oriented Research Guidelines, Procedures, and Tools to Support Implementing Rio Conventions in Jordan" consultancy for the Project "Developing Policy-Relevant Capacity for Implementation of the Global Environmental

Conventions in Jordan" or shortly "the CB-2 Project" implemented in Jordan from 2009-2013 by UNDP-Jordan and MoEnv, supported financially by Global Environment Facility (GEF) and partially by Government of Jordan.

Potential international funding sources to carry out the research necessary to meet the Rio Convention and related protocols that are required to ensure Jordan makes progress towards adoption are included. Private, institutional, foundations, international organizations, and governmental institutions that may potentially fund studies related to the protocols are reported. The areas and guidelines for each are summarized. The report also proposes guidelines to develop high-impact proposals for the various entities. Suggestions for collaboration will be included where appropriate.

In terms of identifying the most effective and sustainable collaboration mechanisms between policy makers and research institutions, the study builds on the findings of the 2011 final report of the first consultancy study performed for the CB-2 Project (RFP1: RFP 2010 /12) titled: "A Study on Potential Institutional Mechanism for Future Collaboration Between Policy and Research Institutions in Relation to Rio Conventions", which identified the proposed collaboration mechanisms as follows:

Priority	
1	National committees Collaboration Fund Research Network for Rio Conventions Follow existing models National conventions coordination office Accessing research findings and reports online
2	Standardize the format of research findings Target research findings to particular committees Calls for research proposals Develop research findings into policy recommendations or implications Facebook, Google groups, Yahoo groups….
3	Coordinate with third parties to disseminate research findings Policy briefs as a communication tool Professional cross-placements (Secondments, sabbaticals, joint appointments and buddies)

It is clear that three Rio Conventions' National Committees established/re-established in Jordan by the CB-2 Project (the National Committee on Climate Change; The National Committee on Biodiversity; and The National Committee on Combating Desertification), which formed the most effective and feasible collaboration mechanisms between policy makers and research communities, ranked as the top priority collaboration mechanism.

2. Policy-oriented Research Guidelines

2.1. Overview of the major obligations/provisions and thematic areas for implementing the Rio Conventions and the related protocols

2.1.1. Major obligations/provisions of the UNFCCC and Kyoto Protocol

Since Jordan is a non-Annex I party to UNFCCC, presently there are only two main obligations for the Kingdom. The obligations, as related to UNFCCC, KP and other agreements developed upon all COPs of the UNFCCC, are essential to implement only upon the availability of funds. The obligations states that all parties, taking into account their common, but differentiated responsibilities, and their specific national and regional development priorities, objectives and circumstances, should:

1) Provide "a national inventory of anthropogenic emissions by sources and removals by sinks of all greenhouse gases not controlled by the Montreal Protocol, to the extent its capacities permit, using comparable methodologies to be promoted and agreed upon by the Conference of the Parties".

2) In carrying out their commitments under Article 4, paragraph 1 (i), the Parties should:

(a) Promote and facilitate at the national and, as appropriate, subregional and regional levels, and in accordance with national laws and regulations, and within their respective capacities:

(i) The development and implementation of educational and public awareness programs on climate change and its effects;

(ii) Public access to information on climate change and its effects;

(iii) Public participation in addressing climate change and its effects and developing adequate responses; and

(iv) Training of scientific, technical and managerial personnel;

(b) Cooperate in and promote, at the international level, and, where appropriate, using existing bodies:

(i) The development and exchange of educational and public awareness material on climate change and its effects; and

(ii) The development and implementation of education and training programs, including the strengthening of national institutions and the exchange or secondment of personnel to train experts in this field, in particular for developing countries.

All other provisions under the UNFCCC, KP and related agreements taking into consideration all the COP meetings to date are considered optional. These can be summarized as follows:

a) Promote sustainable management, and promote and cooperate in the conservation and enhancement, as appropriate, of sinks and reservoirs of all greenhouse gases not controlled by the Montreal Protocol, including biomass, forests and oceans as well as other terrestrial, coastal and marine ecosystems;

b) Cooperate in preparing for adaptation to the impacts of climate change; develop and elaborate appropriate and integrated plans for coastal zone management, water resources and agriculture, and for the protection and rehabilitation of areas, particularly in Africa, affected by drought and desertification, as well as floods;

c) Take climate change considerations into account, to the extent feasible, in their relevant social, economic and environmental policies and actions, and employ appropriate methods, for example impact assessments, formulated and determined nationally, with a view to minimizing adverse effects on the economy, on public health and on the quality of the environment, of projects or measures undertaken by them to mitigate or adapt to climate change;

d) Promote and cooperate in scientific, technological, technical, socio-economic and other research, systematic observation and development of data archives related to the climate system and intended to further the understanding and to reduce or eliminate the remaining uncertainties

regarding the causes, effects, magnitude and timing of climate change and the economic and social consequences of various response strategies;

e) Promote and cooperate in the full, open and prompt exchange of relevant scientific, technological, technical, socio-economic and legal information related to the climate system and climate change, and to the economic and social consequences of various response strategies;
f) Promote and cooperate in education, training and public awareness related to climate change and encourage the widest participation in this process, including that of non-governmental organizations;

At the same time, and according to point 4 of article 12, developing country parties may, on a voluntary basis, propose projects for financing, including specific technologies, materials, equipment, techniques or practices that would be needed to implement such projects, along with, if possible, an estimate of all incremental costs, of the reductions of emissions and increments of removals of greenhouse gases, as well as an estimate of the consequent benefits.

The Kyoto Protocol (KP) adopted in Kyoto, Japan, on 11 December 1997 and entered into force on 16 February 2005 commits industrialized countries to stabilize greenhouse gas emissions based on the principles of the Convention, which encourages countries to do so. KP sets binding emission reduction targets for 37 industrialized countries and the European community. Overall, these targets add up to an average 5% emission reduction compared to 1990 levels for 2008 to 2012.

Clean Development Mechanism (CDM) was defined with the purpose to assist parties not included in Annex I (including Jordan) in achieving sustainable development and in contributing to the ultimate objective of the Convention. CDM also was designed to assist Annex I parties in achieving compliance with their quantified emission limitation and reduction commitments. The CDM assists in arranging funding of certified project activities as necessary. In January 2003, Jordan made an accession (acquisition) to the KP. Jordan will benefit from project activities resulting in certified emission reductions. The COP serving as the meeting of the Parties to this Protocol should ensure that a share of the proceeds from certified project activities is used to cover administrative expenses as well as to assist developing country Parties that are particularly vulnerable to the adverse effects of climate change to meet the costs of adaptation. In accordance to CDM, a Designated National Authority (DNA) was established at MoEnv to benefit from the CDM. Emission reductions resulting from each project activity should be certified by operational entities to be designated by the COP serving as the meeting of the Parties to this Protocol, on the basis of:

(a) Voluntary participation approved by each Party involved;
(b) Real, measurable, and long-term benefits related to the mitigation of climate change; and
(c) Reductions in emissions that are additional to any that would occur in the absence of the certified project activity.

In last COP meeting (at the time of preparing this study: Durban Climate Change Conference held on November/December 2011), the United Nations delivered a breakthrough on the international community's response to climate change. In the second largest meeting of its kind, the negotiations advanced in a balanced fashion the implementation of the Convention and the Kyoto Protocol, the Bali Action Plan, and the Cancun Agreements. The outcomes included a decision by Parties to adopt a universal legal agreement on climate change as soon as possible, and no later than 2015. Thus, at this time it is unclear what Jordan's commitments and obligations will be according to the new universal legal agreement. One of the points being considered is the cancelation of the country obligations list, which means that all countries will be treated equally in UNFCCC commitments (i.e. doing away with Annex I and Annex II parties and Non-annex parties).

According to IPCC Working Groups I, II, III and IV, the major contributions of the findings in climate change were focusing on: (1) identifying the processes of dangerous interference of GHGs with the climate, (2) energy, emissions and trends, (3) technology research, (4) development and deployment, (5) new developments in approaches in impacts, adaptation, vulnerability and integrated assessments for each related sector, (6) risk-

management, and (7) managing uncertainties and confidence level. However, IPCC suggested the following research priorities to be addressed at national level:

1- Improving observations of the climate system.
   a) Improving observations and detection of changes in the climate system on a global scale;
   b) Improving monitoring and observations of regional climate variability and impacts.
2. Improved understanding of radiation forcing processes and coupling.
   a) Climate forcing due to natural and human-induced factors;
   b) Sensitivity of and feedbacks within the climate system, on both local and global scales, and their interaction;
   c) Attribution of climate change at different time and spatial scales.
3. Improve understanding of the potential implications of different atmospheric concentrations of greenhouse gases (GHG).
   a) Magnitude and rate of climate change under different emission scenarios;
   b) Regional and subregional manifestations of global climate change, including its link to climate variability and the frequency and intensity of extreme weather events;
   c) Long-term climate changes (beyond 2100) and probabilities for abrupt changes in the climate system;
   d) Climate change impacts, projections of emissions and integrated economic effects associated with adaptation and mitigation.
4. Impacts, vulnerability and adaptation.
   a) Integrated analysis of climate change impacts and vulnerabilities, including impacts of extreme events and climate variability at regional and smaller geographical scales, as well as the analysis of the additional stress induced by non-climatic factors, and migration responses to climate change;
   b) Economic assessment of the adverse effects of climate change at global and regional scales;
   c) Regional and global climate change impacts associated with different GHG stabilization levels and pathways and their likelihood by region, system and sector;
   d) Likelihood, magnitude and timescale of large impacts and abrupt or irreversible events;
   e) Methodologies, technologies, timing and costs of adaptation;
   f) Adaptation strategies and their link to sustainable development and equity issues with specific focus on developing countries. This should incorporate local strategies aimed at enhancing adaptive capacities to withstand impacts and resilience to potential adverse effects of climate change
5. Mitigation.
   a) The effectiveness of measures and implications of different strategies at the regional and national levels, including analysis of the ancillary benefits, the costs of damages, impacts of response measures, and constraints and opportunities for the adoption of low GHG emitting technologies;
   b) Mitigation options, their costs and the barriers to their implementation;
   c) Means to enhance innovation in GHG abatement technologies and determinants of the rate of technological change;
   d) Geographic distribution of renewable sources and analysis of their cost-effectiveness;
   e) Potential of biological carbon storage;
   f) Land use, land-use change and forestry, and related accounting and reporting.

The Subsidiary Body for Scientific and Technological Advice (SBSTA) reported on progress in research efforts in the areas of identified priorities and identified some of the gaps that needed consideration. In their recent submissions, Parties noted that, although progress has been made since 2002, work needs to continue on improving three main issues. These are:

1- Quantifying of the anthropogenic component of observed changes in climate and estimates of natural influences and natural variability;

2- Understanding the mechanisms and factors, both anthropogenic and natural, leading to changes in radiative forcing, and reducing uncertainties; and

3- Climate related systematic observation and, in particular, a global climate observing system for climate related research.

Several specific subject areas have been identified from UNFCCC-COP meetings as needing additional work to meet the needs of the Convention. These subjects include:

(a) Improvement of methods to quantify uncertainties of climate projections and scenarios, including long-term ensemble simulations using complex models;
(b) Improvements in the integrated hierarchy of global and regional climate models with a focus on the simulation of climate variability, regional climate changes and extreme events; and
(c) More effective links between models of the physical climate and the biogeochemical system, and incorporating the consideration of the human dimension into climate change research.

The main research areas under CC theme are categorized and summarized in Table 1.

TABLE 1: SUMMARY OF THE UNFCCC AND RELATED AGREEMENTS FOR PROVISIONS/SPECIFIC OBLIGATIONS AS RELATED TO RESEARCH THEMES

Article	Mandate	Provisions/main themes	Specific obligation to Jordan	National legislation gaps	Policy-Oriented Rese
UNFCCC article 1	**Definitions**	• Definitions of Climate Change, Adverse effects of Climate Change, Climate System, Emissions, Greenhouse Gases, Regional Economic Integration Organization, Reservoir, Sink, and Source	Not an obligation	There is no specific policy or strategy for climate change in Jordan, thus CC related definitions, objectives and principles are not included anywhere.	Developing a "Climate C main syntax definitions objectives, and principl Jordan, This requires ma UNFCCC into national p Conventions' objectives developmental, or secto groups, government de and businesses to devel change. Strategic plann SWOT analysis holding t issues: • National Greenh and emission fac • Vulnerability and impacts • Adaptation in wa socio-economy, ecosystem. • Gender mainstre • Enhanced comm • Awareness, educ • Mitigation in ene industry as subje and technology t • Forestation prog carbon stocks. • Renewable ener • Energy efficiency • Green buildings. • Finance and tech
UNFCCC article 2	**Objectives**	• To achieve stabilization of GHG concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. Such a level should be achieved within a time frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner.	Not an obligation		
UNFCCC article 3	**Principles**	• Protecting the climate system for the benefit of present and future generations of humankind on the basis of equity and in accordance with countries' common but differentiated responsibilities and respective capabilities. • The specific needs and special circumstances of developing country Parties, especially those that are particularly vulnerable to the adverse effects of climate change, and of those Parties, especially developing country Parties, that would have to bear a disproportionate or abnormal burden under the Convention, should be given full consideration. • Take precautionary measures to anticipate, prevent or minimize the causes of climate change and mitigate its adverse effects. Where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing such measures, taking into account that policies and measures to deal with climate change should be cost-effective so as to ensure global benefits at the lowest possible cost.	Not an obligation		
UNFCCC article 4a COP15	**Commitments/GHG Inventory**	• Develop, periodically update, publish and make available to the COP national inventories of anthropogenic emissions by sources and removals by sinks of all GHG not controlled by the Montreal Protocol	Obligated only upon existence of fund	There is no specific policy or strategy concerning this part, thus updates of MoEnv in corporations with MEMR, MoA, MoT, and MIT are required.	• Quantification o sector including electricity, natur • Quantification o industrial sector product use) this chemical industr energy products product uses as depleting substa manufacture and • Quantification o transportation • Quantification o agricultural secto land use which i manure manage biomass burning direct and indire managed soils, a

Article	Mandate	Provisions/main themes	Specific obligation to Jordan	National legislation gaps	Policy-Oriented Rese
					• Quantification o sector including biological treatm incineration and miscellaneous. • Quantification o sector including Discharge and M • Inventory of all a sinks of GHGs.
UNFCCC article 4b COP13 COP15 COP16	**Commitments/GHG Mitigation**	• Formulate, implement, publish and regularly update national and, where appropriate, regional programmes containing measures to mitigate climate change by addressing anthropogenic emissions by sources and removals by sinks of all GHGs not controlled by the Montreal Protocol • Integrity using markets to enhance the cost-effectiveness of, and to promote, mitigation actions through stimulating mitigation across broad segments of the economy, safeguarding environmental, and ensuring good governance and robust market functioning and regulation	Not an obligation (optional)	Well established strategies exist at MEMR and laws at MoEnv, however MoA, MoT, and MIT strategies require further inclusions.	• Assessing GHG n • Assessing potent GHG emissions b • Assessing potent GHG emissions f • Assessing potent GHG emissions b • Assessing potent GHG emissions f activities • Assessing potent energy utilizatio
UNFCCC article 4c, COP3, COP4, COP13 COP16	**Commitments/Stabilization of GHGs and Technologies Transfer**	• Promote and cooperate in the development, application and diffusion, including transfer, of technologies, practices and processes that control, reduce or prevent anthropogenic emissions of GHG not controlled by the Montreal Protocol in all relevant sectors, including the energy, transport, industry, agriculture, forestry and waste management sectors; • Create an enabling environment to help further stimulate private-sector investment in, and transfer of, environmentally sound technologies; and know-how to developing countries and to promote the implementation of endogenous know-how.	Not an obligation (optional)	Some areas were adopted by the MoEnv at NEEDS, however, updates if possible are required at MEMR, MLTD, MIT, MoMRA and MoEnv	• Improve metho timing and costs (cost and barrier • Means to enhan abatement techn of the rate of tec • Geographic distr sources and anal effectiveness. • Analysis of the a of damages, imp and constraints a adoption of low • Regional and glo assessment asso stabilization leve likelihood by reg
UNFCCC article 4d COP7 CMP.1 COP13 **COP16**	**Commitments/Sustainable Management**	• Promote sustainable management, and promote and cooperate in the conservation and enhancement, as appropriate, of sinks and reservoirs of all greenhouse gases not controlled by the Montreal Protocol, including biomass, forests (afforestation and reforestation) and oceans as well as other terrestrial, coastal and marine ecosystems. • Reduce uncertainty relating to the measurement, estimation, assessment of uncertainties, monitoring and reporting of net carbon stock changes and anthropogenic greenhouse gas emissions by sources and removals by sinks in the land use, land-use change and forestry sector, and provide positive incentives on issues relating to reducing	Not and obligation (optional)	Some points are included at the Agricultural strategy; however, other points as SOC sequestration are missing and needs further inclusion at the MoA.	• Sustainable manage sinks and reservoirs • Enhancement of bio sequestration, • Conservation of fore • Conservation of ocea tterrestrial, coastal a

Article	Mandate	Provisions/main themes	Specific obligation to Jordan	National legislation gaps	Policy-Oriented Rese
		emissions from deforestation and forest degradation			
UNFCCC article 4e COP13 COP16	**Commitments/Vulnerability and Adaptation**	• Cooperate in preparing for adaptation to the impacts of climate change; develop and elaborate appropriate and integrated plans for coastal zone management, water resources and agriculture, and for the protection and rehabilitation of areas, particularly in Africa, affected by drought and desertification, as well as floods. This include risk management and risk reduction strategies, including risk sharing and transfer mechanisms such as insurance; disaster reduction strategies and means to address loss and damage associated with climate change impacts in developing countries that are particularly vulnerable to the adverse effects of climate change; and Economic diversification to build resilience;	Obligated only upon existence of fund	Well established laws and policies exist at the MWI; however, updates are required especially concerning risk analysis. On the other hand, the agricultural part needs inclusion for many missing points.	• Observation, monito impacts on water se • Observation, monito impacts on agricultu • Desertification and b with CC. • Vulnerability and ada climate change on w • Vulnerability and ada climate change on ag
UNFCCC article 4f COP8 COP13 COP16	**Commitments/Socio-economic Impact Assessment**	• Take climate change considerations into account, to the extent feasible, in their relevant social, economic and environmental policies and actions, and employ appropriate methods, for example impact assessments, formulated and determined nationally, with a view to minimizing adverse effects on the economy, on public health and on the quality of the environment, of projects or measures undertaken by them to mitigate or adapt to climate change	Obligated only upon existence of fund	Impact assessment is missing and needs special inclusions at MoSD and MoH.	• Observation, monito impacts on health se • Socio-economic impa regional scales • Vulnerability and ada climate change on he • Vulnerability assessm socio-economic secto
UNFCCC article 5a COP3 COP4 COP15	**Research and Systematic Observation**	• Promote and cooperate in scientific, technological, technical, socio-economic and other research, systematic observation and development of data archives related to the climate system and intended to further the understanding and to reduce or eliminate the remaining uncertainties regarding the causes, effects, magnitude and timing of climate change and the economic and social consequences of various response strategies. • Support the regional and global observational systems developed under the Global Climate Observing System, the Global Ocean Observing System and the Global Terrestrial Observing System, through appropriate funding mechanisms and support national terrestrial networks including observational programmes to collect, exchange and preserve terrestrial data.	Obligated only upon existence of fund	Only available at MoEnv and JMD, however, there is no policy or strategy covers this part and needs corporation of the two parties in addition other related ministries at the impact part. Environmental Information Networking needs activation at MoEnv.	• Improving observatio understanding of rad and coupling • Improve understand implications of differ concentrations of GH • Spatial and temporal variability at local-lo • Climate change proje analysis • Likelihood, magnitud impacts and abrupt c • Uncertainty analysis
UNFCCC article 5b COP4		• Support and further develop, as appropriate, international and intergovernmental programmes and networks or organizations aimed at defining, conducting, assessing and financing research, data collection and systematic observation, taking into account the need to minimize duplication of effort; • Support international and intergovernmental efforts to strengthen systematic observation and national scientific and technical research capacities and capabilities, particularly in developing countries, and to promote access to, and the exchange of, data and analyses thereof	Not and obligation (optional)	Research is developed upon consultation and existence of fund, thus requires fund raising, mainstreaming and network database building between all	• Creation of data ban information on clima • Community-based n sectors (including en agriculture, forestry sectors). • Integrated analysis o vulnerabilities, mitig based system. • International compa to climate change re

Article	Mandate	Provisions/main themes	Specific obligation to Jordan	National legislation gaps	Policy-Oriented Res
		obtained from areas beyond national jurisdiction		ministries.	scientific, technologi economic exchange
UNFCCC article 6 COP5, COP6, COP7	**Education, Training and Public Awareness**	1. Promote and facilitate at the national and, as appropriate, subregional and regional levels, and in accordance with national laws and regulations, and within their respective capacities: i. the development and implementation of educational and public awareness programmes on climate change and its effects; ii. public access to information on climate change and its effects; iii. public participation in addressing climate change and its effects and developing adequate responses; iv. training of scientific, technical and managerial personnel; 2. Cooperate in and promote, at the international level, and, where appropriate, using existing bodies: i. the development and exchange of educational and public awareness material on climate change and its effects; and ii. the development and implementation of education and training programmes, including the strengthening of national institutions and the exchange or secondment of personnel to train experts in this field, in particular for developing countries.	Direct Obligation	Climate change have been incorporated in many educational stages and training and awareness programs have been conducted at variable levels, however, corporation of NIS, MoP, MoHE and MoEnv is required.	• Enhance public awar climate change relat • Promote and corpor education. • Improve institutiona • Integrate climate cha

2.1.2. Major obligations/provisions of the UNCCD

The immediate obligation from UNCCD is the preparation of national action plan (NAP) to combat desertification (Article 10). This obligation was already accomplished by Jordan which launched desertification NAP in 2006 and a review of this plan showed that Jordan had a set of strategies directed towards environment protection and desertification. Additional obligations of UNCCD were mentioned in Articles 4 and 5, which urged countries to provide enabling environment and improved capacities towards the implementation of NAP. The ninth session of the COPs in Buenos Aires in 2009 called for enhancing the implementation of the Convention with a proposed 10-year strategic plan (2008-2018). This should be considered in conducting policy-oriented research in the areas related to the objectives of the strategic plan, particularly the area of identifying benchmarks and indicators for combating desertification. Among the policy-oriented research issues that could contribute to the UNCCD implementation are:

- The link between desertification and poverty;
- The scientific basis for mapping, assessment and monitoring;
- The synergy with UNFCCC and CBD; and
- Strengthening the means for including the Rio Conventions in the country's plans and strategies.

This last point is of great importance, as it requires revision and links among the strategies and policies of the relevant institutions. The link between desertification and poverty is still missing. Strengthening this link requires the cooperation between the Ministry of Environment and the Ministry of Social Development.

In terms of the UNCCD implementation, the key points and the main issues needed for combating desertification are shown in Table 5. Desertification research and development obligations as stated by Article 17 of the UNCCD include: (1) drought mitigation, (2) causes of desertification, (3) research capabilities, and (4) joint research programs. The areas of research were addressed in more detail by the COP and the CST sessions during the period 1997-2008.

The 1st scientific conference of the UNCCD-COP in 2009 which reshaped the operation of the CST, chose the theme "Bio-physical and Socio-Economic Monitoring and Assessment of Desertification and Land Degradation, to Support Decision-Making in Land and Water Management" as the first priority theme. The concept of SLM was also seen imperative to address the UNCCD core mission to combat desertification. The concept of SLM includes water management, monitoring of nutrients, soil carbon and soil information systems, and the interconnections between desertification, climate change and biodiversity loss.

The first scientific conference of CST held in Buenos Aires, Argentina in 2009 came up with 11 topics that refined important research areas. The key research issues in the area of desertification, summarized from the documents of UNCCD, COP and CST, are as follows:

1. Mapping and assessment of desertification
2. Rangeland ecology, degradation and restoration
3. Sustainable Land Management, Desertification and Dryland Degradation (DLDD)
4. Political dimension of desertification
5. Socioeconomic processes, poverty and desertification
6. Droughts and desertification
7. Desertification, climate change and biodiversity
8. Monitoring systems

The main concern for CST was the lack of agreement on protocols and methods to map and to assess desertification. Early warning systems are urgently needed and recommended as priority in order to alleviate the effects of desertification and drought. An emphasis was also made on the concept of sustainable land

management and its direct links to desertification, biodiversity, and climate change. The three thematic areas of Rio Conventions are interrelated and aim to halt and/or mitigate the processes of land and ecosystem degradation. Following the ratification of the three conventions, scientific communities tried to link the processes of land degradation with climate change and their impacts on biodiversity and plant genetic resources. This formed a part of the synergy in the processes of degradation and paths of restoration and rehabilitation.

Although there might be a trade-off between the three conventions and the priority levels in implementation, the scientific communities tried, and are still trying, to identify the cross cutting issues that would enable the understanding of these processes and subsequently identify the most effective means for mitigation, adaptation, and conservation. This will help in identifying benchmarks indicators for monitoring and assessment. At present, the key factors that could link the three land degradation processes are the soil carbon and soil erosion. The interconnections between the desertification/land degradation and drought, climate change and biodiversity loss were also highlighted by the Millennium Ecosystem Assessment (MA) Desertification Synthesis 2005.

According to the UNCCD 1st Scientific Conference, dry lands, which cover a third of the earth's land surface, hold more than one-quarter of the world's organic carbon stores and that DLDD causes the release of an estimated 300 million tons of carbon into the atmosphere annually. The loss of vegetation due to DLDD exposes the soil to erosion and disables the recycling of nutrients, further degrading biomass productivity. These effects also degrade habitats and adaptation conditions needed to support diverse plant and animal species. Less vegetation results in increased surface albedo (reflection) and dust, this may affect climate at the local and global scales. Dust can also affect other ecosystems and human health and should be considered as an important area of research (this factor was identified in the different sessions of COP and CST). The key research issues, as identified by UNCCD, are summarized in Table 2, while research related provisions of COP and CST.

TABLE 2: SUMMARY OF THE UNCCD AND RELATED SESSIONS FOR PROVISIONS/SPECIFIC OBLIGATIONS AS RELATED TO RESEARCH THEMES

Article	Mandate	Provisions/Main themes	Specific obligation to Jordan	National legislation gaps	Policy-Oriented Research Needed to Address Gaps
Article 3	Principles	Community-based participation, involvement and cooperation of all stakeholders at all levels.	Enabling a suitable environment for full participation.	Need to upgrade strategies of MOA, MOMA and MOSD to strengthen participation.	Community-based rehabilitation and restoration of degraded ecosystems
Article 4	General obligations	Adoption of an integrated approach and integration of strategies for poverty eradication.	Integration of desertification with national strategies.	Need to upgrade strategy of MOSD to link sustainable livelihood and resource management with poverty eradication.	1- Mapping and combating of desertification. 2- Desertification and poverty
Article 5	Obligations of affected Parties	• Promotion of awareness and participation of populations, particularly women and youth. • Drought mitigation.	Enabling a suitable environment for full participation and empowering of women and youth.	Need to upgrade MOMA and Youth strategies to include awareness on SLM.	Mapping and mitigation of droughts.
Article 7	Priority for Africa	Assessment of trans-boundary impacts of the problem with focus on impacts of desertification in Sahel on the east Mediterranean countries.	Cooperation among affected parties for monitoring and assessment of desertification.	Lack of the regional cooperation in the area of desertification monitoring in the strategy of MOPIC.	Modelling the impacts of desertification in Africa on wind erosion and climate change in Jordan.
Article 8	Relationships with other conventions	• Encouragement of coordination. • Integrated joint research and training programs.	Prioritization of research related to Rio conventions.	Lack of the synergy among Rio Conventions in the strategies of MOA and MoEnv.	1- Climate change and desertification. 2- Land degradation and soil carbon. 3- Desertification and biodiversity.
Article 10	National Action programs (NAPs)	• Strategies to combat desertification. • Drought early warning systems. • Policies towards implementation.	Implementation of country's NAP to combat desertification.	1- Lack of policy-oriented research in the area of combating desertification in NAP. 2- Lack of the early warning systems from the National Strategy and Action Plan for Drought Mitigation.	1- Drought monitoring and early warning systems. 2- Sustainable irrigation programs. 3- Desertification and poverty.
Article 16	Information collection, analysis and exchange	• Exchange of information through global networks. • Support to programmes of data collection and analysis.	Identifying Protocols for data collection, analysis and exchange.	Identified protocols for data collection and sharing through MoEnv focal points of Rio Conventions.	Monitoring and assessment of desertification
Article 17	Research and development	• Increased knowledge on causes and impacts of desertification. • Develop research capabilities and conduct joint research programs.	Empowering research to combat desertification.	Lack of resource mobilization in the regulations of Environment Protection Fund for policy-oriented research in the areas of Rio Conventions.	1- Causes and impacts of desertification. 2- Water management and cloud seeding.

Article	Mandate	Provisions/Main themes	Specific obligation to Jordan	National legislation gaps	Policy-Oriented Research Needed to Address Gaps
Article 18	Transfer, acquisition, adaptation, and development of technology	Promoting, adopting and enhancing transfer of technology relevant to combating desertification.	Improvement of extension services and awareness campaigns.	Emphasis of technology transfer for combating desertification in the strategy of MOA and NCARE.	1- Technology for sustainable use of land resources. 2- Water management and cloud seeding.
Article 19	Capacity building, education, and public awareness	Strengthening training, education and research capacity in the areas of natural resources management.	Empowerment and training of stakeholders and decision makers.	1- Lack of SLM in the strategies of MOMA, MOE, MWI and Youth. 2- Lack of desertification training programs in the strategies of MOPIC, MOA, NCARE and MoEnv.	1- Use of alternative and renewable energy sources. 2- Role of woman in sustainable management of land resources.
COP1/CST1	Regional Networks and UNCCD implementation	1- Survey and evaluation of relevant networks related to UNCCD. 2- Levels of UNCCD implementation.	Participation in regional networks and exchange of data	Identified protocols for data collection and sharing through MoEnv focal points of Rio Conventions.	Roles of databases and protocols in combating desertification.
COP2/CST2	Research and training	1- Collaboration with other conventions. 2- Identification of Traditional knowledge and early warning systems as the main themes for next session of CST.	Empowering research to combat desertification.	Lack of resource mobilization in the regulations of Environment Protection Fund for policy-oriented research in the areas of Rio Conventions.	Links and synergy among desertification, climate change and loss of biodiversity.
COP3/CST3	UNCCD implementation procedures	1- Procedures for the review of the implementation. 2- Review of policies of GM. 3- UNCCD and IFAD.	Following UNCCD procedures in implementation.	N/A	Traditional knowledge and its roles in the areas of soil and water management.
COP4/CST4	Collaboration with GEF in the area of land degradation	1- Procedures for the review of the implementation of the UNCCD. 2- Collaboration with GEF. 3- Dryland degradation and the MEA.	N/A	N/A	Land degradation
COP5/CST5	Rio Conventions	1- Means to improve the CST. 2- Improving information on benchmarks and indicators, in the national reports.	Prioritization of research related to Rio conventions.	Lack of the early warning systems from the National Strategy and Action Plan for Drought Mitigation.	1- Early warning systems. 2- Land degradation processes.
CRIC 1	Review of communications	Best land management practices and Experience.	Following CRIC guidelines in reporting.	Lack of benchmarks and indicators in the ESIP for assessing UNCCD implementation.	1- Drought and desertification. 2- Rangeland rehabilitation.
COP6/CST6 /CRIC2	Modalities and TOR for coordination.	1- Poverty and food insecurity. 2- Land degradation assessment (LADA).	Integration of desertification into policies and strategies	Lack of SLM and its connection to poverty eradication in the strategy of MOSD.	1- Early warning system. 2- Dryland Degradation Assessment (LADA).
CRIC3	Regional coordination.	Review of the implementation of UNCCD in Africa.	N/A	N/A	Linkages between desertification, migration and conflicts.

Article	Mandate	Provisions/Main themes	Specific obligation to Jordan	National legislation gaps	Policy-Oriented Research Needed to Address Gaps
COP7/CST7 /CRIC4	Regional coordination.	Strengthening the implementation of the Convention in Africa.	N/A	N/A	Pilot studies on early warning systems
CRIC5	Resource mobilization	Mobilization and use of financial resources.	Improvement of extension services and awareness campaigns.	Emphasis of technology transfer for combating desertification in the strategy of MOA and NCARE.	Drought mitigation
COP8/CST8/CRIC6 CRIC7/CST-S1 COP/CST9 /CRIC8 COP10/CST10 /CRIC 10	UNCCD 10-year Strategy (2008-2018	1- Options for enhanced cooperation among the Rio Conventions. 2- The effects of climatic variations and human activities on land degradation.	Consider CST recommendations on research needs on dryland degradation.	Lack of the policy-oriented research in the area of combating desertification in NAP.	1- SLM and land degradation. 2- Links and synergy among desertification, climate change and loss of biodiversity.

2.1.3. Major obligations/provisions of the CBD

The main obligations and/or provisions requirements under the CBD (COP and SBSTTA meetings) and relevant protocols along with research areas are listed in Tables 3 and 4. The CBD translates its guiding objectives into binding commitments in the substantive provisions contained in Articles 6, 8, 9, 10, 12, 17, and 19. The precise obligations that are placed upon the Parties are in Articles 8, 17, 18, and 19. However, most of these commitments are qualified: their implementation will depend upon the particular national circumstances and priorities, as well as on the resources available to them (NCSA, 2007). The most important provisions and/or obligations concerning Party commitments and responsibilities lay in the reports and recommendations from SBSTTA with various thematic areas for implementing the CBD and relevant protocols. For example:

Article 6 urges Parties to develop their national biodiversity strategies, plans or programs, and to integrate the objectives of the convention into relevant sectoral or cross-sectoral plans, programs and policies. According to reports and recommendations of SBSTTA, the research areas that could cope with Article 6 are:

- Monitor the impacts of climate change on biodiversity and ecosystem services, and assess the future risks for biodiversity and ecosystem services.
- Assess the impacts of climate change on biodiversity-based livelihoods, particularly within vulnerable ecosystems.
- Ecosystem-based Adaptation.
- Utilize the adaptive capacity of species and the resilience of ecosystems in the face of climate change.
- Develop, adopt a policy instrument, and commence implementing an effective, participatory and updated national biodiversity strategy and action plan.

Articles 8 and 9 ask parties to address both in-situ and ex-situ conservation, but emphasis is given to in-situ measures where the evolution process maintained for species. The In-situ conservation research areas are to focus on an integral conservation of genes, species, and ecosystems in their natural surroundings. Considering should be given to the local community involvement and for woman participation. For example, by establishing protected areas, rehabilitating degraded ecosystems, and adopting legislation to protect threatened species. The contribution of ex-situ facilities, techniques and measures, such as gene banks, botanic gardens, zoos, aquaria, and biotechnology (tissue culture, cryopreservation, gene libraries, molecular markers) can effectively be made to the conservation and sustainable use of biological diversity, particularly when environmental and political crises occur. Moreover, the ex situ conservation is assumed to complement in situ conservation as a backup of species genetic material that are conserved under controlled conditions. In addition, Article 9 urges parties to facilitate ex-situ conservation establishment and maintenance in the country of origin of the genetic resources.

Article 10 urges parties to integrate and adopt measures to conserve and sustainably use biological resources. It also considers the sustainable utilization of biological resources in accordance with traditional cultural practices and to support local populations in degraded areas where biological diversity has been reduced. It also encourages cooperation between governmental authorities and private sector in developing methods for sustainable use of biological resources. The thematic research areas that could tackle the implementing Article 10 are:

- Establishment of diverse agro-forestry systems to cope with increased risk from changed climatic conditions.
- Enhance the benefits to all from biodiversity and ecosystem services.

- Enhance ecosystem resilience and the contribution of biodiversity to carbon stocks through conservation and restoration (including restoration of at least 15% of degraded ecosystems).
- Enhance ecosystem resilience to contribute to climate change mitigation and adaptation and to combating desertification.

Articles 12, 17, 18 and 19 relate to the obligation of technology transfer. It is important to stress that the obligations imposed by Article 18 mandates Parties to support international cooperation in the development and the use of technology, as well as the establishment of joint research programs and joint ventures to develop technologies relevant to the objectives of the Convention. The provisions of scientific and technical co-operation provide a basis for capacity-building activities. For example, the COP has requested the financial mechanism to support a Global Taxonomy Initiative designed to develop national, regional and sub-regional training programs on taxonomy, and to strengthen reference collections in countries of origin. The requirements concerning Party obligations and provisions included in the articles 12, 17, 18 and 19 could address the implementation of CBD through main research areas mentioned in Table 6. However, it is emphasized that the research areas of Article 19 (handling of biotechnology and distribution of its benefits) have been extensively documented through CBD protocols like the Cartagena Protocol on Biosafety, Nagoya Protocol on Access and Benefit Sharing and the Nagoya – Kuala Lumpur Supplementary Protocol on Liability and Redress (Table 7). The proposed research areas needed to address provisions and/or obligation of Article 19 are:

- Develop and implement national legislations and regulations on bio-safety and LMOs.
- Adopt programs to increase awareness on GMO and related protocols and regulations.
- Review and adopt property rights.
- Enhance the benefits to all from biodiversity and ecosystem services.
- Establishment biotechnology center.
- Maintain and protect biodiversity through controlling alien species.

The provisions concerning Party obligations and/or provision are directly related to policy oriented research guidelines which could address the support and implementation of CBD through the proposed main research areas mentioned in Tables 3 and 4. These articles are likely to address the national sustainable development concerns that can be categorized into six categories:

1. Public participation,
2. Technology transfer and cooperation,
3. Financial mechanisms,
4. Legislations formulation,
5. Research communities,
6. Enforcement and monitoring and evaluation

TABLE 3: SUMMARY OF THE CBD ARTICLES PROVISIONS/SPECIFIC OBLIGATIONS AS RELATED TO RESEARCH THEMES

Article	Mandate	Provisions/main themes	Specific obligations to Jordan	National legislation gaps	Policy oriented research themes to address the gap
6	General Measures for Conservation and Sustainable Use	(a) Develop national strategies, plans or programs for the conservation and sustainable use of biological diversity, (b) Integrate, as far as possible and as appropriate, the conservation and sustainable use of biological diversity into relevant sectoral or cross-sectoral plans, programs and policies.		Lack of uniform and definite national biodiversity legislations and regulations. - Need for measurement and monitoring unit for conservation and sustainable use of biodiversity	- Links between biodiversity and climate change - Ecosystem-based Adaptation - Develop, adopt a policy instrument, and commence implementing an effective, participatory and updated national biodiversity strategy and action plan
8	In-situ conservation	(a) Establish protected areas, (b) Develop guidelines for the selection protected areas, (c) Regulate biological resources, (d) Promote the protection of ecosystems, (e) Promote development in areas adjacent to protected areas, (f) Rehabilitate and restore degraded ecosystems, (g) Prevent the introduction of, control or eradicate those alien species which threaten ecosystems, habitats or species, (h) Maintain knowledge, innovations and practices of indigenous and local communities, (i) Develop or maintain necessary legislation.	Establish means to regulate, manage or control the risks associated with the use and release of living modified organisms resulting from biotechnology which are likely to have adverse environmental impacts that could affect the conservation and sustainable use of biological diversity, taking also into account the risks to human health.	Legislations relevant to protected areas and land use are general and fragmented in MoEnv, MoA, and MoW&I. - Regulations on biosafety and LMOs are ineffective. - Policy and strategy of biodiversity conservation and sustainable utilization are not tackled by the MoSD.	- Address the underlying causes of biodiversity loss by mainstreaming biodiversity across government and society. -Take steps to achieve or have implemented plans for sustainable production and consumption and have kept the impacts of use of natural resources well within safe ecological limits.
9	Ex-situ conservation	(a) Adopt ex-situ conservation of components of biological diversity, (b) Establish and maintain facilities for ex-situ conservation of and research on plants, animals and micro- organisms, (c) Adopt measures for the recovery and rehabilitation of threatened species, (d) Regulate and manage collection of biological resources from natural		- There is no adoption for definite national regulations neither national strategy for national genetic resources collection, conservation, maintenance, germplasm movements and exchanges, and overall management of biological resources from natural habitats. - Funds are limited to facilitate ex situ conservation. - Rehabilitation programs needs to	- Conservation of agrobiodiversity to provide specific gene pools for crop and livestock adaptation to climate change. - Conservation of endangered genetic resources, collection and characterization of endangered local genetic resources,

Article	Mandate	Provisions/main themes	Specific obligations to Jordan	National legislation gaps	Policy oriented research themes to address the gap
		habitats, (e) Establishment and maintenance of ex- situ conservation facilities.		be advocated using local species	
10	Sustainable Use of Components of Biological Diversity	(a) Integrate consideration of the conservation and sustainable use of biological resources into national decision-making; (b) Adopt measures relating to the use of biological resources, (c) Protect use of biological resources in accordance with traditional cultural practices, (d) Support local populations in degraded areas where biological diversity has been reduced, (e) Encourage cooperation between its governmental authorities and its private sector in developing methods for sustainable use of biological resources.		- The biodiversity action plan needs to be implemented and frequently updated to cope with new global challenges like climate change and water scarcity. - The components of biological diversity in Jordan are identified but no programs are developed for sustainable utilization of BD components. - Limited Governmental efforts are exist to integrate indigenous and local communities in sustainable protection of biodiversity	- Establishment of diverse agroforestry systems to cope with increased risk from changed climatic conditions. - Enhance the benefits to all from biodiversity and ecosystem services. - Enhance ecosystem resilience and the contribution of biodiversity to carbon stocks through conservation and restoration, including restoration of at least 15% of degraded ecosystems, thereby contributing to climate change mitigation and adaptation and to combating desertification.
12	Research and training	(a) Establish and maintain programs for scientific and technical education and training in measures for the identification, conservation and sustainable use of biological diversity and its components, (b) Promote research which contributes to the conservation and sustainable use of biological diversity.		There are limited governmental programs and plans to support universities and research centres to conduct researches relevant to CBD.	- Enhance implementation CBD participatory planning, knowledge management and capacity building - Establishment center of BD

Article	Mandate	Provisions/main themes	Specific obligations to Jordan	National legislation gaps	Policy oriented research themes to address the gap
13	Public Education and Awareness	Cooperate, as appropriate, with international organizations in developing educational and public awareness programs	Promote understanding of the importance of, and the measures required for, the conservation of biological diversity through media, and the inclusion of these topics in educational programs	- Almost there are no definite and time line programs on biodiversity awareness CBD. - Limited cooperation between Institutions of high concern of biodiversity issues (MoEnv, MoA, MW&I) and the Ministry of Social Development	- Develop biodiversity media corporate. - Reinforce cooperation with educational institute to develop biodiversity modules
17	Exchange of information	Facilitate the exchange of information, from all publicly available sources, relevant to the conservation and sustainable use of biological diversity. Exchange of information includes repatriation of information.	Exchange of information should include exchange of results of technical, scientific and socio-economic research, as well as information on training and surveying programs, specialized knowledge, indigenous and traditional knowledge.	- Lack of uniform and definite national biodiversity legislations and regulations that cover the issue of information exchange including conservation and sustainable utilization.	- Develop database for biodiversity - Encourage exchange of taxonomic voucher specimens for non-commercial biodiversity research to find ways of facilitating and benefiting from scientific and technical collaborations in accordance with relevant national legislation.
18	Technical and Scientific Cooperation		(1) Promote international technical and scientific cooperation in the field of conservation and sustainable use of biological diversity through the appropriate international and national institutions. (2) Promote technical and scientific cooperation with developing countries through the development and implementation of national policies. (4) Encourage and develop methods of cooperation for the development and use of technologies. (5) Promote the establishment of joint research programs.	- Guidelines for international cooperation in the field of conservation and sustainable use of biological diversity that are available in national institutes and ministries are limited, fragmented and inconsistent.	- Developing and strengthening of national capabilities, by means of human resources development and institution building. - Use of indigenous and traditional technologies and promote cooperation in the training of personnel and exchange of experts. - Developing cooperative monitoring system to assess the status of biodiversity in a particular region. - Develop national, regional and sub-regional training programs on taxonomy, and to strengthen reference collections in countries of origin.

Article	Mandate	Provisions/main themes	Specific obligations to Jordan	National legislation gaps	Policy oriented research themes to address the gap
19	Handling of biotechnology and distribution of its benefits	Take legislative, administrative or policy measures to provide for the effective participation in biotechnological research activities which provide the genetic resources for such research.	(1) Take all practicable measures to promote access on a fair and equitable basis to the results and benefits arising from biotechnologies based upon genetic resources. (2) Consider the need for and modalities of a protocol setting out appropriate procedures, including, in particular, advance informed agreement, in the field of the safe transfer, handling and use of any living modified organism resulting from biotechnology that may have adverse effect on the conservation and sustainable use of biological diversity. (3) Provide any available information about the use and safety regulations required in handling living modified organism, as well as any available information on the potential adverse impact into which those organisms are to be introduced.	- Week progress is achieved on implementing the national biosafety protocol.	- Enhance the benefits to all from biodiversity and ecosystem services. - Establish biotechnology center.

TABLE 4: SUMMARY OF THE ARTICLES OF CBD PROTOCOLS FOR PROVISIONS/SPECIFIC OBLIGATIONS AS RELATED TO RESEARCH THEMES

Article	Mandate	Provisions/main themes	Obligations/main themes	National legislation gaps	Policy oriented research themes to address the gap
I. The Cartagena Protocol on Biosafety to the Convention on Biological Diversity					
2	General Provisions	(a) Take appropriate legal, administrative to implement its obligations under this Protocol. (b) Ensure that the development, handling, transport, use, transfer and release of any LMO are undertaken in a manner that prevents or reduces the risks to biological diversity, taking also into account risks to human health.	Take appropriate legal, administrative to implement its obligations under this Protocol.	- Need to develop, ratify and implement the Bio-safety national Law and regulations.	- Establishment of Bio-safety unit at the ministry of environment.
11	Procedure for Living Modified Organisms Intended for Direct Use as Food or Feed, or For Processing	- Improve capacity for data Collection and management, and the establishment of infrastructure to share information at national and international levels.	- Lack of scientific certainty regarding the extent of the adverse effects of a LMO on biological diversity shall not Prevent Party from taking a decision with regard to the import of LMO intended for direct use as food or feed, or for processing, in order to avoid adverse effects.	- The Bio-safety national Law and regulations are not comprehensively developed and ratified.	- Risk assessment on the potential adverse effects of the LMO on the conservation and sustainable use of biological diversity. - Estimation of the overall risk posed by the LMO was based on the evaluation of the likelihood and consequences of the identified adverse effects on BD.
Article	**Mandate**	**Provisions/main themes**	**Obligations/main themes**	**National legislation gaps**	**Policy oriented research themes to address the gap**

12	Risk Assessment	- Risk assessments shall be carried out in a scientifically sound manner taking into account risk assessment techniques and based on information and scientific evidence in order to identify and evaluate the possible adverse effects of LMO on the conservation and sustainable use of BD. - Provide information regarding risk assessment and risk management of LMOs.	- The Party of import shall ensure that risk assessments are carried out and it may require the exporter to carry out the risk assessment.	- The international Risk assessments measurements are not applied in Jordan.	- Identification of novel genotypic and phenotypic characteristics associated with the LMO that may have adverse effects on BD and risks to human health - Evaluation of adverse effects of LMO on environment. - Establishment of database relevant to LMO.
16	Risk Management	- Taking appropriate measures regarding the treatment of LMO or specific traits.	- Establish mechanisms, measures and strategies to regulate, manage and control risks identified in the risk assessment provisions associated with the use, handling and transboundary movement of LMO. - Identify LMO that may have adverse effects on BD.	- The international Risk management measurements are not applied in Jordan.	- Identification of strategies to manage risks of LMO. - Establishment biotechnology center. - Establish and activate laboratories of Genetically Modified Organism.
Article	**Mandate**	**Provisions/main themes**	**Obligations/main themes**	**National legislation gaps**	**Policy oriented research themes to address the gap**

22	Capacity-building	1. Strengthening of human resources and institutional capacities in bio-safety. 2. Cooperation between developing country Parties, for financial resources and access to and transfer of technology and know-how.	1. Cooperate in the development and/or strengthening of human resources and institutional capacities in bio-safety, including biotechnology for the purpose of the effective implementation of this Protocol.	- Weak cooperation with national and international bodies to promote and facilitate public awareness.	- Enhance institutional and educational Bio-safety programs. - Scientific and technical training in the proper and safe management of biotechnology. - Scientific and technical training in the use of risk assessment and risk management for bio-safety.
23	Public awareness and participation	- Consult the public in the decision-making process regarding LMO and make the results of such decisions available to the public.	- Facilitate public awareness and education on Biosafety. - Endeavour to ensure that public awareness and education encompass Access to information on LMO.	- Cooperation with national and international bodies to promote and facilitate public awareness is weak. - The biosafety Law and regulations are not adopted	- Public participation in improvement Bio-safety regulations. - Enhance public awareness programs and campaigns relevant to adverse effect of LMO on biodiversity. - Enhance public awareness programs relevant to property rights.
26	Socio-economic considerations	1. Take into account socio-economic considerations arising from the impact of LMO on the conservation and Sustainable use of BD with regard to the value of BD to indigenous and local communities.		- The role of national indigenous and local communities in conserving BD from the impact of LMO is not identified in the strategies of MoSD.	- Enhance and support indigenous and local communities to conserve BD from the impact of LMO. - Increase cooperation between indigenous and local communities to face the adverse effect of LMO. - Documentation of traditional knowledge and know how arising from sustainable utilization of BD. - Monitoring the status of BD and controlling invasive species.
Article	**Mandate**	**Provisions/main themes**	**Obligations/main themes**	**National legislation gaps**	**Policy oriented research themes to address the gap**

27	Liability and redress	- Adopt a process with respect to the appropriate elaboration of international rules and procedures in the field of liability and redress for damage resulting from transboundary movements of LMO.	- Adopt Nagoya – Kuala Lumpur Supplementary Protocol on Liability and redress.	- The protocol is not published in the national Gazette	- Characterization and analysis of damage resulting from transboundary movements of LMO.
II. The Nagoya – Kuala Lumpur Supplementary Protocol on Liability and Redress to the Cartagena Protocol on Biosafety					
3	Scope	- Applies to damage resulting from LMO which find their origin in a trans-boundary movement. The LMO are those: Intended for direct use as food or feed, or for processing; - Destined for contained use; Intended for intentional introduction into the environment.	- Include to damage resulting from LMO: the items find their origin in a trans-boundary movement, and the intended for direct use as food or feed, or for processing	- Liability and redress are not comprehensively included in the national biosafety regulations.	- Assessment of damage resulting from living modified organisms.
12	Implementation and relation to civil liability	- Provide for rules and procedures that address damage, and apply existing domestic law, including procedures on civil liability.	- Adopt national procedures that address damage including procedures on civil liability.	- There is no specific domestic law on LMO liability and redress.	- Build up domestic law on civil liability relevant to LMO through addressing the elements of damage and right to bring claims.
III. The Nagoya Protocol on Access and Benefit-sharing					
3	Scope	Genetic resources and to the benefits arising from the utilization of such resources, traditional knowledge associated with genetic resources and to the benefits arising from the utilization of such knowledge.	- Regulate and manage collection of biological resources from natural habitats	- Regulations relevant to manage collection of biological resources from natural habitats are not adopted.	- Develop comprehensive national database on Genetic resources and associated knowledge.
Article	**Mandate**	**Provisions/main themes**	**Obligations/main themes**	**National legislation gaps**	**Policy oriented research themes to address the gap**

5	Fair and equitable benefit-sharing	- Take legislative, administrative or policy measures with the aim of ensuring that benefits arising from the utilization of genetic resources that are held by indigenous and local communities are shared in a fair and equitable way with the communities.	- Regulate, adopt policies and strategies on utilization of genetic resources that are held by indigenous and local communities	- Policies and regulations relevant to utilization of genetic resources that are held by indigenous and local communities are not developed.	- Advocate the indigenous and local communities holding knowledge of utilization of genetic resources to share their knowledge in fair and equitable way. - Initiate awareness programs on access and Benefit-sharing protocol.
6	Access to genetic resources	- Access to genetic resources for their utilization shall be subject to the prior informed consent of the Party providing resources.	- Regulate and manage collection and exchange of biological resources from natural habitats	- Regulations on access to genetic resources not developed	- Develop national strategy for plant genetic resources and crop wild relatives.
7	Access to traditional knowledge associated with genetic resources	- Take measures with the aim of ensuring that traditional knowledge associated with genetic resources that is held by indigenous and local communities is accessed with the prior and informed consent.	- Adopt regulations on exchanging biological resources including traditional knowledge associated with genetic resources that is held by indigenous and local communities	- Regulations on access to traditional knowledge associated with genetic resources are not developed.	- Magnifying participation of indigenous and local communities in the managerial process of access to traditional knowledge associated with genetic resources. - Gender mainstreaming and women's empowerment
8	Special considerations	a. Create conditions to promote research which contributes to the conservation and sustainable use of BD, including through simplified measures on access for non-commercial research purposes. c. Consider the importance of genetic resources for food and agriculture and their special role for food security	- Promote researches on biodiversity conservation and sustainable utilization.	- Lack of strategy on genetic resources conservation, sustainable utilization and management.	- Advocate role of genetic resources and crop wild relatives to accomplish food security.
Article	**Mandate**	**Provisions/main themes**	**Obligations/main themes**	**National legislation gaps**	**Policy oriented research themes to address the gap**

9	Contribution to conservation and sustainable use	Encourage users and providers to direct benefits arising from the utilization of genetic resources towards the conservation of biological diversity and the sustainable use of its components.	- Encourage programs relevant to direct benefits arising from utilization of genetic resources.	- lack of uniform and integration between ministries, governmental research institutes, educational research institutes, NGOs and local communities	- Elaborate the socioeconomic value of BD. - Application of managerial methods and measurable procedures for sustainable utilization of BD.
10	Global Multilateral Benefit-sharing Mechanism	Consider the need for a global multilateral benefit-sharing mechanism to address the fair and equitable sharing of benefits derived from the utilization of genetic resources and traditional knowledge associated with genetic resources that occur in transboundary situations or for which it is not possible to grant or obtain prior informed consent.	- Incorporate with the global multilateral benefit-sharing mechanism to address the fair and equitable sharing of benefits derived from the utilization of genetic resources and traditional knowledge	- Regulations on multilateral benefit-sharing mechanism not developed.	- Utilization of the benefits shared by users of genetic resources and traditional knowledge associated with genetic resources through this mechanism to support the conservation of biological diversity and the sustainable use of its components globally.
12	Traditional knowledge associated with genetic resources	- Consider indigenous and local communities' customary laws, community protocols and procedures with respect to traditional knowledge associated with genetic resources. - Support the development by indigenous and local communities, including women within these communities.	- Incorporate indigenous and local communities' customary laws, community protocols and procedures with respect to traditional knowledge associated with genetic resources.	- Gender mainstreaming not properly covered in national policies	- Establishment of Small and medium enterprise (SME) based on Traditional Knowledge Associated with Genetic Resources.
Article	**Mandate**	**Provisions/main themes**	**Obligations/main themes**	**National legislation gaps**	**Policy oriented research themes to address the gap**
I. The Cartagena Protocol on Biosafety to the Convention on Biological Diversity					

2	General Provisions	(a) Take appropriate legal, administrative to implement its obligations under this Protocol. (b) Ensure that the development, handling, transport, use, transfer and release of any LMO are undertaken in a manner that prevents or reduces the risks to biological diversity, taking also into account risks to human health.	Take appropriate legal, administrative to implement its obligations under this Protocol.	- Need to develop, ratify and implement the Bio-safety national Law and regulations.	- Establishment of Bio-safety unit at the ministry of environment.
11	Procedure for Living Modified Organisms Intended for Direct Use as Food or Feed, or For Processing	- Improve capacity for data Collection and management, and the establishment of infrastructure to share information at national and international levels.	- Lack of scientific certainty regarding the extent of the adverse effects of a LMO on biological diversity shall not Prevent Party from taking a decision with regard to the import of LMO intended for direct use as food or feed, or for processing, in order to avoid adverse effects.	- The Bio-safety national Law and regulations are not comprehensively developed and ratified.	- Risk assessment on the potential adverse effects of the LMO on the conservation and sustainable use of biological diversity. - Estimation of the overall risk posed by the LMO was based on the evaluation of the likelihood and consequences of the identified adverse effects on BD.
12	Risk Assessment	- Risk assessments shall be carried out in a scientifically sound manner taking into account risk assessment techniques and based on information and scientific evidence in order to identify and evaluate the possible adverse effects of LMO on the conservation and sustainable use of BD. - Provide information regarding risk assessment and risk management of LMOs.	- The Party of import shall ensure that risk assessments are carried out and it may require the exporter to carry out the risk assessment.	- The international Risk assessments measurements are not applied in Jordan.	- Identification of novel genotypic and phenotypic characteristics associated with the LMO that may have adverse effects on BD and risks to human health - Evaluation of adverse effects of LMO on environment. - Establishment of database relevant to LMO.

Article	Mandate	Provisions/main themes	Obligations/main themes	National legislation gaps	Policy oriented research themes to address the gap
16	Risk Management	- Taking appropriate measures regarding the treatment of LMO or specific traits.	- Establish mechanisms, measures and strategies to regulate, manage and control risks identified in the risk assessment provisions associated with the use, handling and transboundary movement of LMO. - Identify LMO that may have adverse effects on BD.	- The international Risk management measurements are not applied in Jordan.	- Identification of strategies to manage risks of LMO. - Establishment biotechnology center. - Establish and activate laboratories of Genetically Modified Organism.
22	Capacity-building	1. Strengthening of human resources and institutional capacities in bio-safety. 2. Cooperation between developing country Parties, for financial resources and access to and transfer of technology and know-how.	1. Cooperate in the development and/or strengthening of human resources and institutional capacities in bio-safety, including biotechnology for the purpose of the effective implementation of this Protocol.	- Weak cooperation with national and international bodies to promote and facilitate public awareness.	- Enhance institutional and educational Bio-safety programs. - Scientific and technical training in the proper and safe management of biotechnology. - Scientific and technical training in the use of risk assessment and risk management for bio-safety.
23	Public awareness and participation	- Consult the public in the decision-making process regarding LMO and make the results of such decisions available to the public.	- Facilitate public awareness and education on Biosafety. - Endeavour to ensure that public awareness and education encompass Access to information on LMO.	- Cooperation with national and international bodies to promote and facilitate public awareness is weak. - The biosafety Law and regulations are not adopted	- Public participation in improvement Bio-safety regulations. - Enhance public awareness programs and campaigns relevant to adverse effect of LMO on biodiversity. - Enhance public awareness programs relevant to property rights.

Article	Mandate	Provisions/main themes	Obligations/main themes	National legislation gaps	Policy oriented research themes to address the gap
26	Socio-economic considerations	1. Take into account socio-economic considerations arising from the impact of LMO on the conservation and Sustainable use of BD with regard to the value of BD to indigenous and local communities.		- The role of national indigenous and local communities in conserving BD from the impact of LMO is not identified in the strategies of MoSD.	- Enhance and support indigenous and local communities to conserve BD from the impact of LMO. - Increase cooperation between indigenous and local communities to face the adverse effect of LMO. - Documentation of traditional knowledge and know how arising from sustainable utilization of BD. - Monitoring the status of BD and controlling invasive species.
27	Liability and redress	- Adopt a process with respect to the appropriate elaboration of international rules and procedures in the field of liability and redress for damage resulting from trans-boundary movements of LMO.	- Adopt Nagoya – Kuala Lumpur Supplementary Protocol on Liability and redress.	- The protocol is not published in the national Gazette	- Characterization and analysis of damage resulting from transboundary movements of LMO.
II. The Nagoya – Kuala Lumpur Supplementary Protocol on Liability and Redress to the Cartagena Protocol on Biosafety					
3	Scope	- Applies to damage resulting from LMO which find their origin in a trans-boundary movement. The LMO are those: Intended for direct use as food or feed, or for processing; - Destined for contained use; Intended for intentional introduction into the environment.	- Include to damage resulting from LMO: the items find their origin in a trans-boundary movement, and the intended for direct use as food or feed, or for processing	- Liability and redress are not comprehensively included in the national biosafety regulations.	- Assessment of damage resulting from living modified organisms.

Article	Mandate	Provisions/main themes	Obligations/main themes	National legislation gaps	Policy oriented research themes to address the gap
12	Implementation and relation to civil liability	- Provide for rules and procedures that address damage, and apply existing domestic law, including procedures on civil liability.	- Adopt national procedures that address damage including procedures on civil liability.	- There is no specific domestic law on LMO liability and redress.	- Build up domestic law on civil liability relevant to LMO through addressing the elements of damage and right to bring claims.
III. The Nagoya Protocol on Access and Benefit-sharing					
3	Scope	Genetic resources and to the benefits arising from the utilization of such resources, traditional knowledge associated with genetic resources and to the benefits arising from the utilization of such knowledge.	- Regulate and manage collection of biological resources from natural habitats	- Regulations relevant to manage collection of biological resources from natural habitats are not adopted.	- Develop comprehensive national database on Genetic resources and associated knowledge.
5	Fair and equitable benefit-sharing	- Take legislative, administrative or policy measures with the aim of ensuring that benefits arising from the utilization of genetic resources that are held by indigenous and local communities are shared in a fair and equitable way with the communities.	- Regulate, adopt policies and strategies on utilization of genetic resources that are held by indigenous and local communities	- Policies and regulations relevant to utilization of genetic resources that are held by indigenous and local communities are not developed.	- Advocate the indigenous and local communities holding knowledge of utilization of genetic resources to share their knowledge in fair and equitable way. - Initiate awareness programs on access and Benefit-sharing protocol.
6	Access to genetic resources	- Access to genetic resources for their utilization shall be subject to the prior informed consent of the Party providing resources.	- Regulate and manage collection and exchange of biological resources from natural habitats	- Regulations on access to genetic resources not developed	- Develop national strategy for plant genetic resources and crop wild relatives.

7	Access to traditional knowledge associated with genetic resources	- Take measures with the aim of ensuring that traditional knowledge associated with genetic resources that is held by indigenous and local communities is accessed with the prior and informed consent.	- Adopt regulations on exchanging biological resources including traditional knowledge associated with genetic resources that is held by indigenous and local communities	- Regulations on access to traditional knowledge associated with genetic resources are not developed.	- Magnifying participation of indigenous and local communities in the managerial process of access to traditional knowledge associated with genetic resources. - Gender mainstreaming and women's empowerment
Article	**Mandate**	**Provisions/main themes**	**Obligations/main themes**	**National legislation gaps**	**Policy oriented research themes to address the gap**
8	Special considerations	a. Create conditions to promote research which contributes to the conservation and sustainable use of BD, including through simplified measures on access for non-commercial research purposes. c. Consider the importance of genetic resources for food and agriculture and their special role for food security	- Promote researches on biodiversity conservation and sustainable utilization.	- Lack of strategy on genetic resources conservation, sustainable utilization and management.	- Advocate role of genetic resources and crop wild relatives to accomplish food security.
9	Contribution to conservation and sustainable use	Encourage users and providers to direct benefits arising from the utilization of genetic resources towards the conservation of biological diversity and the sustainable use of its components.	- Encourage programs relevant to direct benefits arising from utilization of genetic resources.	- lack of uniform and integration between ministries, governmental research institutes, educational research institutes, NGOs and local communities	- Elaborate the socioeconomic value of BD. - Application of managerial methods and measurable procedures for sustainable utilization of BD.

10	Global Multilateral Benefit-sharing Mechanism	Consider the need for a global multilateral benefit-sharing mechanism to address the fair and equitable sharing of benefits derived from the utilization of genetic resources and traditional knowledge associated with genetic resources that occur in transboundary situations or for which it is not possible to grant or obtain prior informed consent.	- Incorporate with the global multilateral benefit-sharing mechanism to address the fair and equitable sharing of benefits derived from the utilization of genetic resources and traditional knowledge	- Regulations on multilateral benefit-sharing mechanism not developed.	- Utilization of the benefits shared by users of genetic resources and traditional knowledge associated with genetic resources through this mechanism to support the conservation of biological diversity and the sustainable use of its components globally.
Article	**Mandate**	**Provisions/main themes**	**Obligations/main themes**	**National legislation gaps**	**Policy oriented research themes to address the gap**
12	Traditional knowledge associated with genetic resources	- Consider indigenous and local communities' customary laws, community protocols and procedures with respect to traditional knowledge associated with genetic resources. - Support the development by indigenous and local communities, including women within these communities.	- Incorporate indigenous and local communities' customary laws, community protocols and procedures with respect to traditional knowledge associated with genetic resources.	- Gender mainstreaming not properly covered in national policies	- Establishment of Small and medium enterprise (SME) based on Traditional Knowledge Associated with Genetic Resources.

2.2. Summary of National Research Progress in the Thematic Areas of Rio Conventions

2.2.1. Summary of national research progress in the area of climate change

Climate Change (CC) has gained widespread recognition only in the last few years despite the fact that the phenomenon has been set in motion by anthropogenic impacts over the past few decades. It is only in the last few years that the threat from climate change has received attention, and the understanding is still evolving. Similarly, the climate change themes at the environmental policies, strategies, and action plans are still vague. In some cases, the climate change themes were either linked with drought or desertification assessment. Eventually, climate change research in Jordan suffers from underfunding, availability of data and facilities, and the lack of national policies. Raising the profile of climate change research on the national agenda requires bringing policy makers closer to the research community and mainstream provisions of UNFCCC into national policy through inclusion of Conventions' objectives and principles in national developmental or sectoral planning by community groups, government departments, organizations and businesses to develop blueprint for action and change.

Governmental Ministries

Unfortunately, there is not even a single policy directing the planning of climate change studies in Jordan, and so far, there is no specific climate change strategic plan have being launched. On the other hand, Jordan has developed various policies, strategies and proposed different action plans, proposed and launched different projects to enhance development, management, and use of various environmental resources. These policies, strategies, action plans have a minor implementation on the ground without international funds, however, these projects included various measures related to creating enabling environment, defining institutional roles and establishing management tools which are the three main pillars required for the successful implementation of Integrated Resources Management (IRM). Implemented projects could be summarized in climate change mandates of GHG inventories, climate change impact assessments, climate change mitigation, energy saving and renewable energy, adaptation to climate change, and awareness, educational and training programs.

Research Institutions

Climate change research was unfortunately initiated in the begging of the second millennium and after ratification of the UNFCCC. Most of the work focused on natural resources conservation and management as a part of climate change themes, however the research situation was also manifested in financial constraints that evolves in an inadequate progress in implementing the Rio Conventions. According to RFP1 draft report titled "A Study on Potential Institutional Mechanism for Future Collaboration between Policy and Research Institutions in Relation to Rio Conventions"; several climate change related research conducted in Jordan at the following climate change related research themes:

1. Impacts and vulnerability
    - Current and historical climate (Paleoclimatology) and its impacts.
    - Projected climate change.

- Current and future climate variability and extreme events,
- Implications for sustainable development.
- Socio-economic aspects of climate change.

2. Adaptation planning, measures and actions
    - Adaptation planning, measures and actions.
    - Past and current practical adaptation actions and measures.

On the other hand, national research on adaptation and mitigation of climate change impacts was evolving recently, but however most of such research is on the development of initiatives phase. During the last fifteen years, most of the research conducted on aspects related to climate change was focusing on studying the potential impact of such phenomenon on natural resources. Due to the water scarcity in Jordan, water resources were the main target for researchers to research the impacts on its quality and quantity and model future scenarios. At the same time, several researchers at Jordanian universities tried to link the climate change with biodiversity and desertification as synergies (e.g. climate change and its impact on soil and vegetation carbon storage risks to water availability and quality and potential impacts of climate change on the rainfed agriculture of a semi-arid basin in Jordan) (BAU, 2011).

Non-Governmental Organizations (NGOs)

Climate change has become the main focus of the NGOs research activities especially concerning building scientific knowledge and enhancing data banking. According to UNFCCC, NGOs have a potential for being funded for implementation programs and educational and awareness programs. NGOs findings will assess ministries in mainstreaming towards applicable and effective policies. The main active NGO in Jordan are RSCN, RBJ, IUCN, FOE, JES, LAHAP, NEWS, APN, JREDS, JSC, AAEWE, JADRW, JAGISST, and ECSE.

Private Sector

The UNFCCC gave special attention for private sector collaboration in the fields of the adaptation and mitigation implementation programs and their vital role in technology transfer especially at chemical industry and renewable energy. Private sector started to become partial research institutions in parallel to investment projects. An example is the Jordan Climate Change Consultancy Company (JCCCC) with their vision to be leaders in the region markets in improving the quality of life of its people through clean climate. Some of their performing consultation is the fuel switching project of the Aqaba thermal power station, feasibility study for biodiesel production by cultivation Jatropha plant in Jordanian deserts, preliminary feasibility study project for the manufacture of fermentation of animal waste for bio-gas extraction, feasibility study project for electricity generation by wind energy of 5 MW.

2.2.2. Summary of national research progress in the area of desertification

Many research and research projects have been carried out on desertification and arid land resources and their environments in Jordan. The list of research institutions, researchers and areas of research were summarized in the 2011 final report of RFP1 of CB-2 Project (RFP 2010 /12 titled: "A Study on Potential Institutional Mechanism for Future Collaboration Between Policy and Research Institutions in Relation to Rio Conventions"). The main areas of research related to UNCCD were summarized as follows:

- Soil degradation, conservation and management
- Rangeland resources degradation and restoration
- Indicators for monitoring drought and land degradation
- Water resources use and management
- Water harvesting
- Traditional knowledge
- Socioeconomics dimensions of desertification
- Land use and land cover changes.
- Climate change

The following is a synopsis of some research and activities from major implementing institutions, with one or two examples on each. More information is available on the websites of these institutions and 2011 final report of RFP1 of CB-2 Project (RFP 2010 /12 titled: "A Study on Potential Institutional Mechanism for Future Collaboration Between Policy and Research Institutions in Relation to Rio Conventions.")

Governmental Research Programs

The major program was the Badia Research and Development Program (BRDP) which was implemented by the Higher Council of Science and Technology. This program attracted many researchers from Jordan and overseas to work on the northern and northeastern Badia, where rainfall is less than 200 mm and arid climate is dominant. The research of BRDC was multidisciplinary and included the assessment of rangeland resources, mapping of vegetation and water resources, assessment of socioeconomic conditions. In addition, implementation of water harvesting techniques and restoration approaches in the target area of the program were studied. An important outcome from this program was the capacity building among the researchers from the local communities of the Badia, which enabled many researchers to pursue their MSc and PhD studies in areas related to desertification and dryland degradation.

Governmental Research and Educational Institutions:

Many Universities were involved in research related to desertification. The Faculty of Agriculture and the Faculty of Science at the University of Jordan were the first to work on research related to land management and biodiversity conservation. With time, other universities (Yarmouk, JUST, Muatah, Hashemite) were also involved in research related to desertification. Currently, most of the governmental and private sector universities have

research centers working in the areas of water, land and environment. Some of these projects are financed by WB, EU, USAID, GTZ, ALIC, NATO-SfP, IDRC, UNDP, FAO, UNESCO and other international funding agencies.

Regarding research institutions, the National Center for Agriculture Research and Extension (NCARE), formerly known as NCARTT, is involved in several research projects related to desertification. One example on these projects is the Badia Benchmark project, which was implemented jointly with ICARDA. Other projects are also initiated in the areas of soil, water and land management. Another important project at NCARE is the drought monitoring center which was established in 2008 by a fund from WFP. The center is currently working on mapping drought using vegetation indices (NDVI) from earth observation systems. The center may need link with data from Department of Meteorology and other regional centers to develop early warning systems.

Non-Governmental Organizations (NGOs) and civil societies:

Research activities of NGOs are carried out to provide a scientific base to aid conservation efforts of nature, forests, and rangeland vegetation and to identify means for creating sustainable income resources for local communities. Other activities are related to public awareness programs. Examples on NGOs and civil societies involved in these research activities are the RSCN, RBJ, IUCN and JSDCBD.

Regional research centers

The most important regional research center in the region that has direct link to research institutions in Jordan is the International Center for Agricultural Research in the Dry Areas (ICARDA). This center has carried intensive research in dryland agriculture, plant genetic resources and desertification. As a member of the Consultative Group on International Agricultural Research (CGIAR), ICARDA is in the process of reforming research initiatives as funding becoming increasingly restricted. The most important outcome from this reform is the following thematic areas of research:

1) Integrated agriculture systems for the poor and vulnerable
2) Policies, institutions, and markets for food security and incomes for the rural poor
3) Sustainable productivity increase for global food security.
4) Agriculture for improved nutrition and health
5) Water, land and ecosystems
6) Forests, Trees and Agroforestry
7) Climate change, agriculture and food security

Obviously, the above areas are directly and indirectly linked to desertification and provide areas of cooperation among research institution in the area.

The other important regional center is the Arab Center for Studies of Arid zones and Dryland management (ACSAD). The center provides consultative studies in the region and has worked jointly with many institutions in Jordan. Both of ICARDA and ACSAD provide good opportunities for cooperation and joint research in the areas of desertification.

Ministries

Many development projects related to desertification were implemented, or currently ongoing, by the Ministry of Agriculture, Ministry of Environment, and Ministry of Water and Irrigation. When completed, the projects will provide baseline data for assessing desertification in the country. A good example is the National Soil Map and Land Use Project (NSMLUP) which was implemented by the Ministry of Agriculture during 1989-1995. The project produced soil maps and land suitability maps for Jordan at different scales. Important outputs from the project are the soil observations (40,000) and the soil profiles with detailed soil chemical and physical properties for about 2,000 locations. The Ministry of Water and Irrigation is also involved in several projects that of water harvesting in the Badia region, and hydrological studies in different parts of the country. The Ministry of Environment is currently implementing the Badia Restoration Program (BRP) in the Northern Badia.

Obviously, research initiatives in Jordan have included many projects in the field of desertification. The main focus of these initiatives has been land resource conservation and management. The processes of land degradation are well identified by the researchers from educational institutions, NGOs, and governmental agencies. Although the results still lack linkages with decision-making, many research projects and several surveys have been conducted in fields related to the three Rio Conventions. The objectives and goals, in many cases, are different from the UNCCD. Therefore, research would need orientation towards assessment of DLDD, mapping the extent of soil erosion by wind and water, soil and water conservation, and desertification and poverty. These issues are well synchronized with the key objectives of the CST.

A comparison of research initiatives in Jordan with the UNCCD desertification research provisions shows that some research areas are still deficient and need further investigation. The following areas emphasized by the CST of the UNCCD 1st Scientific Conference in 2011 that need further investigation and action in Jordan:

- Mapping and assessment of desertification at country level
- Drought mapping, monitoring and assessment
- Synergy between the three Rio Conventions
- Monitoring of desertification

2.2.3. Summary of national research progress in the area of biodiversity

The research institutions and universities in Jordan are contributing to the implementation of the CBD by carrying out several types of biodiversity research. During past decade, the main focus of these studies has been conservation and diversity assessment of species using various techniques. In

recent years, and in response to face environmental challenges of desertification and climate change, a slight shift toward conducting studies involved with sustainable utilization of biodiversity components has been occurred.

Despite the important of results obtained by biodiversity research carried out in Jordan, there exists a weak and fragile connection between scientific community and policy-making community. Research activities and results are not linked to the process of policy development or to the general public. In addition, there are several biodiversity convention themes that are still not being addressed and promoted by research activities.

Nevertheless, the biodiversity research initiatives in Jordan are increasing in quantity and quality. The process of conservation and sustainable utilization of biodiversity components are of concern by educational institutes, governmental institutions and NGOs. In addition, various research projects and several investigations have been conducted in fields related to the CBD- Rio Convention. The 2011 final report of RFP1 of CB-2 Project (RFP 2010 /12 titled: "A Study on Potential Institutional Mechanism for Future Collaboration Between Policy and Research Institutions in Relation to Rio Conventions") listed the research institutions studies and areas of research on biodiversity. The main thematic areas of research under the CBD can be summarized as follows

- Mountain biodiversity
- Agricultural biodiversity
- Forest biodiversity
- Inland water biodiversity
- Marine and coastal biodiversity
- Dry and sub-humid lands biodiversity
- Taxonomy.
- Protected areas.

The Research area of biodiversity has been tackled by various national research, activities, and programs that have been conducted by governmental research programs, educational research institutes, and NGOs. The major programs were presented in the final report of the RFP1 of CB-2 Project (RFP 2010 /12: Developing Policy Capacity). These activities and research could be used in policy-oriented research guidelines to support implementation of CBD because they are relatively associated with some Biodiversity thematic research areas. Following is a brief on major projects and programs that were carried out in the areas of CBD and key involved institutions:

Governmental institutes research programs

The National Center for Agricultural Research and Extension was the main governmental research institute conducting biodiversity research projects and programs, among them are: the agro-biodiversity project (2000- 2004) funded by UNDP-GEF, conservation of medicinal and herbal project (2004-2009) funded by World Bank, Improve rangeland productivity management program (2001-2004), and Improve soil conservation and conserve agricultural natural resources (2010-2011). These programs and projects were aiming for the conservation of agricultural biodiversity, dry and sub-humid lands biodiversity and taxonomy. The major outcomes of these two projects are the capacity building of local communities and farmers and

scholarships for MSc and PhD studies in areas related to biodiversity assessment and conservation. Other major programs are conducted by Badia Research and Development Centre. These projects are: Sustainable development of the degraded Badia environment to compact desertification (1997) and Obtain information on the Badia's human and natural resource bases, and to present that information to decision-makers at various levels (2003).

Educational institutions

Extensive and various research activities on biodiversity have been conducted by many Universities. The University of Jordan was a pioneer in implementing biodiversity research work, during the period 1980-2011. Studies were conducted on marine environment, taxonomy, improvement of agricultural productivity, flora and vegetation, biodiversity and conservation of wild life, cost-benefit analysis and socioeconomic analysis, desert and medicinal plant species, and tissue culture. Taxonomic and flora and vegetation research was conducted by Yarmouk University in 1978. In addition, the Jordan University of Science and Technology conducted distinguished studies that tackled the biodiversity research thematic areas during the period 2000-2011. These studies included ecosystems, forest biological diversity and mountain ecosystem mammology, and entomology. The Hashemite University conducted research of ecology and zoology. Muteh University carried out biodiversity research relevant to ecology, vertebrates, invertebrate genetics, molecular biology, and biotechnology and hematology during the period 2000-2011.

Non-Governmental Organizations (NGOs)

The Royal Society for the Conservation of Nature (RSCN) is considered the major NGO working on conservation of biological diversity and in situ conservation techniques and ecosystem services. For example, in 2007, the RSCN adopted biodiversity program on environment monitoring and protection in Jordan through the provision of an online real-time data collection platform. The Royal Botanical Garden (RBG) is newly born and focuses on conservation of native species and conducting research on vegetation diversity, rehabilitation, plant taxonomy, vegetation communities and ecosystem services. The RBG is collaborating with IUCN in a research study on biodiversity and habitat loss, and species extinction.

Ministries

The environmental developmental projects and programs conducted by Ministry of Agriculture, Ministry of Environment, Ministry of Water and Irrigation engage in biodiversity areas. For example, in 2001, the forest department in the Ministry of Agriculture carried out a project on addressing problems related to the development of suitable technologies for afforestation and improving forest productivity. On the other hand, an ongoing project of conservation (ex situ and in situ) and sustainable utilization of plant biodiversity is the mandate of the biodiversity, genetic resources and medicinal plant directorate at the NCARE/ MoA where the national genebank is hosting more than 6000 accessions ready to distribute, exchange and contribute in biodiversity research and development programs.

The biodiversity projects and programs that were carried out as individual scientific research and/or with international partners were funded by external sources. Almost all of these research projects comply directly or indirectly with the CBD thematic areas and most of them were conducted after ratifying CBD. Research on utilization of biological diversity components and biotechnology fields is limited comparing with other research areas. Moreover, it is noticeable that some programs are general and do not focus on particular thematic area of biodiversity. On the other hand, it is worth

to mention that the CBD share with UNCCD and UNFCCC many research themes as most of desertification and climate research areas are highly associated with biodiversity in aspects like drought, vegetation cover and rehabilitation programs. For example, the Badia Restoration Program (BRP) which being implemented by the MoEnv through a UNCCD fund, conducted a vegetation survey for identifying the prevailed species and to estimate population size in Badia region in order to provide the project with crucial data and information to enable the project to carry out the ideal restoration of the terrestrial ecosystems of the Badia which was degraded as a result of the 1990 gulf war.

2.3. Prioritized Research Topics in the Areas of Rio Conventions

Priority research areas were identified by the stakeholder evaluation analysis. The key stakeholders included the following:

1) Ministries: Ministry of Environment (MoEnv), Ministry of Water and Irrigation (MWI), Ministry of Agriculture (MOA), Ministry of Energy and Mineral Resources (MEMER), Ministry of Higher Education and Scientific Research (MoESR), and Ministry of Social Development (MOSD).
2) Universities: University of Jordan, Yarmouk University, Jordan University of Science and Technology, Al-Bayt University, Hashemite University, Balqa Applied University, Mu'tah University, and other private universities.
3) Higher Council of Science & Technology (HCST).
4) National Center for Agricultural Research and Extension (NCARE), Center of Badia Development, etc.
5) NGOs: Jordan Environmental Society, Jordan Society to Combat Desertification, Royal Society for Conservation of Nature, Royal Botanic Garden, Jordan Society for Scientific Research, Al Shajara NGO, etc.
6) The three thematic research groups.

In order to have a feasible, legitimate, and accurate evaluation of all suggested research areas in each of the three Rio thematic groups, a prioritization scheme was developed (Table 5). The prioritization criteria were initially developed by the team and presented to the stakeholders for feedback. The process included six main criterion related to the Rio Conventions:

1. Relevance to Rio Conventions
2. Sustainability factors
3. Social factors
4. Risk and Urgency
5. Opportunity
6. Implementation factors

Each criterion was subdivided into subgroups (a total of twenty three sub-criterions) with variable weights relative to their importance. The results of the stakeholder group discussions are briefly described in Table 8 for each sub-criterion.

TABLE 5: CRITERIA PROPOSED TO PRIORITIZE THE SUGGESTED RESEARCH AREAS OF THE THREE RIO-CONVENTIONS

Criteria	Weight	Sub-criteria	Description	Proposed Sub-weight
Rio Conventions	30	Relevance to Rio Commitments	The degree of relevance of this research area to Rio commitments and its national obligations.	8
		Consistency to National Policies	The degree of which this research area is consistent to national policies, strategies and action plans (compared to gap analyses).	8
		Capability of Rio Synergies	Is this research field capable to link between two or more of Rio thematic groups?	7
		Logical Importance	Is this research area important to initiate other research areas or fields? Is this research area considered fundamentally superior to other research?	7
Sustainability Factors	10	Sustainability benefits	The degree of which this research area reduces impacts, reduces exposure, and enhances resilience or opportunities.	3
		Ecosystem Impact	The degree that this research might impose impacts on ecological systems (i.e. agriculture, biodiversity, etc).	4
		Monitoring and Evaluation	The degree of which this research area is able to monitor and evaluate sustainable development.	3
Social Factors	15	Equity	The degree of which this research area is beneficial to people of various gender, age, and class.	3
		Involvement of Local Community	The degree of local involvement in this research area.	3
		Women Empowerment	Does this research area empower women in various research tasks?	3
		Role of end-users	The degree of which end users can participate or benefit from this research area.	3
		Public Acceptability	The degree of public support and acceptance to this research field.	3
Risk and Urgency	15	Urgency	Is this research area very urgent (compare to the time frame of other national projects from recent past or from present until short- and long-term futures)?	5
		Risk	Does this research area overcome any potential future risks that are presently minor and reversible from becoming major and irreversible?	5
		Uncertainty	How well are the risks associated with the research area understood? What is the degree of uncertainties associated in the research outputs?	5
Opportunity	15	Ancillary Benefits	How much will this research area contribute to overall community goals (poverty, education, gender, health, and other environmental factors)?	5
		Funding sources	Are there any available sources of potential funds for this research area?	5
		Window of opportunity	Is there currently a window of opportunity to implement this research area?	5
Implementation	15	Cost	Does this measure have a relatively low estimated cost of implementation (lower cost has more weight)?	3
		Cost Effectiveness	Is this research area cost effective (i.e. will bring high relative benefits relative to the costs)?	3
		Capacity	Is there a sufficient capacity (information, technical, staff, resources) to implement this research area?	3
		Institutional	Is the implementation of this research area within local control (i.e. low weight means it requires coordination with, or action by, other jurisdictions)?	3
		Technology Transfer and Cooperation	Does this research area promote technology transfer and cooperation on a regional scale?	3
Score	Total			100

2.3.1. Prioritized research topics in the area of climate change

The proposed research subjects in climate change area listed in table (4) that were gathered from articles of UNFCCC, Kyoto Protocol[3], as well as all COP, CMP, and SBSTA meetings were submitted to all stakeholders along with the mentioned criteria (Table 8) in a simple visually-instructed excel format sheet in order to put score to prioritize research topics accordingly. The sheet provides comments and instruction for each criterion on click/command base before entering any number. Thus, the prioritization was conducted on a basis of total score method, in which the research area that receives the highest sum of weights for the six main criterion (total of twenty three sub-criterions with total weight of 100) of relevance to Rio Conventions, sustainability, social, risk and urgency, opportunity, and implementation factor is considered of high priority.

According to stakeholders' evaluation for the suggested research areas in the field of climate change, results indicate that "Impact, vulnerability and adaptation" research themes are considered the first research priorities, with "Vulnerability and adaptation assessment of climate change on agriculture sector" with an average score of 83.1 overweighing, surprisingly, "Vulnerability and adaptation assessment of climate change on water sector" where the later got an average score of 82.7. It was though initially that the water sector's Vulnerability and adaptation assessment will rank first due to significance of water shortage problem in Jordan and seriousness of potential impact of climate change on such highly vulnerable sector. But stakeholders were satisfied that agricultural sector, who was considered a "left behind" sector in regard of climate change initiative, is now leading research focus agenda. This result agrees with findings of National Capacity Self Assessment report through which low capacity for developing national vulnerability studies and adaptation measures and plans are considered the first constrain towards the implementation of climate change research in Jordan. At the same time, this result is considered of vital importance to MoEnv to start adopting NAPAs that consider a major obligatory focus of the COPs up to dates. After Durban platform, Jordan may be obligated to show real implementation plans for climate change adaptation. At the same time, numerous funds have been established by the UNFCCC for adaptation programs.

The evaluation was quite fair enough for "Research, Systematic Observation, Education, Training and Public Awareness" research theme category. According to the evaluation results, the topic "Enhance public awareness and training in climate change related issues" ranked among the top ten priorities (ranked the ninth) while the theme "Promote and corporate climate change in education" received almost the same score as the tenth research priority. However, the very important theme of national priority "Climate change projection and downscaling analysis" had an upper middle rank, (which pertains to the overall category of "*Promote policy-supporting cc research*" that received a lower middle rank) are still considered areas of relatively low rank of priorities in light of the crucial need of Jordan for such capacity. Knowing the importance of downscaling, "spatial and temporal analysis for climate variability at local-long period scale" ranked in the lowest ten priorities, even though it is very important to define the impact, vulnerability and risk assessment studies in all sectors. Thus, this theme should have ranked among the top priorities. However, the evaluation results agree with NCSA, NEEDS and other document that the lack of climate change database, which ranked lower middle, is the major obstacle for national research progress in the field of climate change, and thus the "*creation of data banking and public access to information on climate change related issues*" should be and have been a need of high priority, even though ranked lower middle in the

[3] The original work submitted by the consultant in February 2012 included only potential climate change research areas extracted from the provisions and obligations in the UNFCCC, Kyoto Protocol, as well as all COP, CMP, and SBSTA meetings (total was 45 potential research topics). However, after developing a National Climate Change Policy for Jordan for the first time in February 2013, the CB-2 Project Manager integrated in this work potential climate change research topics extracted from the provisions of the Policy (new total became 60 potential research topics).

research priorities tables. Results from the stakeholders evaluation for research priorities in the area of climate change is shown in Table 6a.

TABLE 6A: TABLE 6A: STAKEHOLDERS EVALUATION RESULTS FOR RESEARCH PRIORITIES IN THE AREA OF CLIMATE CHANGE[4]

Prioritized climate change research topics	Overall score
34. Vulnerability and adaptation assessment of climate change on agriculture sector.	83.1
33. Vulnerability and adaptation assessment of climate change on water sector.	82.7
31. Observation, monitoring and estimation of CC impacts on agriculture and food security (solutions to limited data availability, lack of models and tools specifically designed for local conditions).	80.0
30. Observation, monitoring and estimation of CC impacts on water sector (solutions to limited data availability, lack of models and tools specifically designed for local conditions; improve meteorological and water monitoring through modernization of equipment and extension of monitoring networks; Raising technical capacity for monitoring and data collection, data management and updating of basic data sets, and preparation of basic maps and databases.	79.0
32. Desertification and biodiversity interactions with CC (solutions to limited data availability, lack of models and tools specifically designed for local conditions).	78.9
35. Ecosystem-based adaptation and cost-effective (enhancing the resilience of ecosystems and natural habitats to the impacts of Climate Change).	78.8
40. Vulnerability assessment of climate change on socio-economic sector (vulnerable groups with emphasis on the poor).	78.7
57. Integrate climate change in current legislative and policy framework.	76.7
55. Enhance public awareness and training in climate change related issues.	76.4
41. Vulnerability assessment of climate change on socio-economic sector (vulnerable groups with emphasis on gender mainstreaming).	75.4
55. Promote and corporate climate change in education.	75.3
36. Obstacles hindering securing and mobilizing national and international financial resources to conduct studies to improve knowledge regarding climate change impacts and adaptation opportunities in Jordan (Securing and mobilizing financial resources to implement priority adaptation projects).	74.8
16. Increase of the percentage of electricity production from renewable sources (energy supply side).	74.7
39. Vulnerability and adaptation assessment of climate change on health sector.	74.7
56. Improve institutional capacity building.	74.4
42. Vulnerability assessment of climate change on socio-economic sector (vulnerable groups with emphasis on the youth): enhancing environmental knowledge between youth and its accessibility according to the educational needs and interests with special focus on early stages of education; increasing the impact of youth in developing and implementing national environmental policies and programs; and maximizing the role of youth in sustainable use of environmental resources for socio-economic development.	73.9
17. Assessing potential measures to improve energy utilization efficiency (energy demand side).	73.8
43. Socio-economic cost-benefit analysis of the Climate Change Policy.	73.4
37. Observation, monitoring and estimation of CC impacts on health sector (solutions to limited data availability, lack of models and tools specifically designed for local conditions).	73.4
59. Ensure that the interests of vulnerable groups (i.e poor, gender, and youth) are adequately addressed in national mitigation and adaptation policies.	72.5
48. Climate change projection and downscaling analysis.	72.2

[4] The original work submitted by the consultant in February 2012 included only potential climate change research areas extracted from the provisions and obligations in the UNFCCC, Kyoto Protocol, as well as all COP, CMP, and SBSTA meetings (total was 45 potential research topics). However, after developing a National Climate Change Policy for Jordan for the first time in February 2013, the CB-2 Project Manager integrated in this work potential climate change research topics extracted from the provisions of the Policy (new total became 60 potential research topics)

9. Assessing GHG mitigation options.	71.8
38. Socio-economic impacts analysis at global and regional scales.	71.7
13. Assessing potential measures to reduce GHG emissions by agriculture sector.	71.0
10. Assessing potential measures to reduce GHG emissions by energy sector (including energy industries subsector and transport subsector).	70.2
58. Integrate climate change in Green Growth and Sustainable Development Plans.	70.0
5. Quantification of GHGs emissions by agricultural sector including forestry and land use which implies enteric fermentation, manure management, LULC change, biomass burning, liming, urea application, direct and indirect N2O emissions from managed soils, and miscellaneous.	69.9
11. Assessing potential measures to reduce GHG emissions from waste (including wastewater) sector.	69.2
2. Quantification of GHGs emissions by energy sector including fossil fuel combustion, electricity, natural gas, etc.	69.1
14. Assessing potential measures to reduce GHG emissions from other resources and activities (landuse, landuse change and forestry).	69.0
53. Integrated analysis of climate change impacts, vulnerabilities, mitigation and adaptation in unit based system.	69.0
60. Advance policies and initiatives to promote private sector investment (- sectoral and legislative reforms at national level to encourage public-private partnerships).	68.5
28. Conservation of forests.	68.0
8. Inventory of all anthropogenic removal sinks of GHGs.	68.0
4. Quantification of GHGs emissions by transportation.	67.9
44. Promote policy-supporting cc research.	67.8
21. Geographic distribution of renewable sources and analysis of their cost-effectiveness.	67.7
6. Quantification of GHGs emissions by waste sector including solid waste disposal, biological treatment of solid waste, incineration and open burning of waste, and miscellaneous.	67.5
51. Creation of data banking and public access to information on climate change related issues.	67.2
52. Community-based network in all relevant sectors (including energy, transport, industry, agriculture, forestry and waste management sectors).	67.1
7. Quantification of GHGs emissions by water sector including Wastewater Treatment and Discharge and Miscellaneous.	67.0
3. Quantification of GHGs emissions by industrial sector (industrial processes and product use) this include mineral industry, chemical industry, metal industry, non-energy products, electronics industry, product uses as substitutes for ozone depleting substances, other product manufacture and use, and miscellaneous.	66.8
1. Design an effective system to “measure, report, and verify” "MRV" of greenhouse gas inventory.	66.4
23. Assessing constraints and gaps for technology transfer.	66.0
15. Assessing potential measures to reduce GHG emissions from other resources and activities such as buildings and residential facilities, etc).	65.1
24. Assessing barriers and understanding possible hurdles of engaging the private sector in providing technical solutions to the implementation of and investing in NAMAs projects and identifying the right incentives to engage the private sector in this process.	65.0
54. International comparisons and regional network to climate change related field to promote scientific, technological, technical, socio-economic exchange.	64.5
22. Analysis of the ancillary benefits, the costs of damages, impacts of response measures, and constraints and opportunities for the adoption of low GHG emitting technologies.	64.3
49. Likelihood, magnitude and timescale of large impacts and abrupt or irreversible events.	63.1
29. Conservation of oceans as well as other terrestrial, coastal and marine ecosystems.	62.9
19. National technology needs assessment and improve methodologies, technologies, timing and costs of mitigation measures (cost and barriers analyses) at all sectors.	62.7
47. Spatial and temporal analysis for climate variability at local-long period scale.	62.6
25. Regional and global climate change impact assessment associated with different GHG stabilization levels and pathways and their likelihood by region, system and sector.	61.7
20. Means to enhance innovation in GHG abatement technologies and determinants of the rate of technological change.	61.1

12. Assessing potential measures to reduce GHG emissions from industrial processes sector.	59.1
46. Improve understanding of the potential implications of different atmospheric concentrations of GHGs.	57.8
27. Enhancement of biomass and carbon sequestration.	57.4
50. Uncertainty analysis for GHG inventory.	56.8
18. Assessing the most feasible cross-cutting policy instruments for climate change mitigation in Jordan such as Regulatory/command-and-control; market mechanisms; financial incentives/grants; fiscal incentives; taxation; voluntary agreements; information and awareness/knowledge transfer.	56.0
45. Improving observations, monitoring, and understanding of radiation forcing, processes and coupling.	55.7
26. Carbon capture and storage (CCS) and sustainable management, and enhancement of sinks and reservoirs of all GHGs.	54.8

Colour index of reach categories

GHG Inventory
Mitigation
Stabilization of GHGs, Technologies Transfer, and Finance
Sustainable Management
Impact, Vulnerability and Adaptation
Socio-economic Impact Assessment
Research, Systematic Observation, Education, Training and Public Awareness.
Climate Change Legal and Institutional Framework

2.3.2. Prioritized research topics in the area of desertification

Potential research areas in desertification presented for prioritization based on feedback from stakeholders were collated from articles and provisions of UNCCD, COP, CST, and CRIC. These research topics were submitted for all stakeholders along with the mentioned criteria (Table 8) in a spread sheet. The sheet provided scores for each criterion on click/command base before entering any number. Thus, the prioritization was conducted on a basis of total score method, in which the research area that received the highest sum of weights for the six main criteria (Relevance to Rio Conventions, sustainability, social, risk and urgency, opportunity, and implementation factor) was considered of high priority.

The research topic “Water Management and its roles in combating desertification “ was seen as the top national priority as it is related to combating desertification and improving livelihood of local communities. “Soil Conservation measures to combat desertification” and “Drought prediction and mitigation” are also high priority research areas. Summary of research areas and their priorities is shown in Table 6b.

TABLE 6A: TABLE 6B: STAKEHOLDERS EVALUATION RESULTS FOR RESEARCH PRIORITIES IN THE AREA OF DESERTIFICATION

Prioritized desertification research topics	Overall score
3.1. Water Management and its roles in combating desertification	88
3.2. Soil Conservation measures to combat desertification	85
5.3. Drought Mitigation	84
5.4. Community Participation and Public awareness (Holistic Management Approach)	83
4.3. Training and capacity building roles in combating desertification	82
5.2. Livelihood and rural poverty links to desertification (Holistic Management Approach)	81
6.1. Internal feedback mechanism (Impacts of land use change on droughts and desertification).	80
8.1. Creation of suitable databases and selection of suitable monitoring tools.	76
5.1. Indigenous knowledge and its roles in combating desertification (Holistic Management Approach)	76

7.1. Linkages among land degradation processes	75
1.1 Indicators of desertification	74
1.2 Contemporary tools for mapping desertification	73
6.2. External forcing (Climate change effects on desertification)	72
4.2. Institutional mechanism for combating desertification	70
8.2. Benchmarks and indicators for implementing UNCCD and NAP	69
2.2. Use of non-equilibrium models for rangeland restoration (community-based approach)	67
3.3. Livestock management	67
7.2. Soil carbon and soil erosion	66
2.1. Use of equilibrium models for rangeland restoration	65
4.1. Assessment of the impacts of policies and economic structural programs on desertification	64

Colour index of reach categories

1. Mapping of desertification
2. Rangeland ecology, degradation and restoration
3. Sustainable Land Management (SLM)
4. Political dimension of desertification
5. Socioeconomic processes and desertification
6.Droughts and desertification
7. Desertification, climate change and biodiversity
8.Monitoring and assessment

2.3.3. Prioritized research topics in the area of biodiversity

For the purpose of identifying the prioritized research needs in the area of biodiversity, major research areas are suggested under biodiversity thematic areas of climate change and desertification, agricultural biodiversity, dry and sub-humid lands biodiversity, forest biodiversity, mountain biodiversity, marine and coastal biodiversity, inland water biodiversity, protected areas, and taxonomy (Table 6c). The proposed criteria to prioritize the suggested research areas of the three Rio Conventions mentioned in Table 8 were applied in order to evaluate the research priorities in the area of biodiversity. An Excel sheet containing suggested research areas was distributed to the biodiversity stakeholders as their feedback is very important for identifying policy-oriented research areas of priority. The suggested research areas were collected and extracted according to global interest cleared in CBD provisions, COPs resolutions and SBSTTA recommendations, also high consideration of the national biodiversity studies were applied. Among the national studies used for research prioritization are: the Biodiversity Strategy and Action Plan (NBSAP, 2003) which adopted (during the national workshop attended by 35 institutions and supported by NCSA) prioritization of the main actions contained in the NBSAP for the years 2005-2010 and the resulting list of 25 priority projects, the study of research priorities in Jordan for the years 2011-2020 (HCST, 2010), and the final report of the consulting study of the CB-2 Project (RFP1:RFP 2010 /12: "A Study on Potential Institutional Mechanism for Future Collaboration between Policy and Research Institutions in Relation to Rio Conventions." Suggested research areas and proposed criteria to prioritize the suggested researches of biodiversity are shown in Table 6c.

The evaluation was not fair enough for "Research and Systematic Observation" research themes because limited feedback information was obtained from the stakeholders. However, the extensive two days (25-26th Feb. 2012, Amman) training workshop on "Understanding the science of environmental governance and building capacity of skills of development of environmental policies and strategies related to the implementation of Rio Conventions in Jordan and integration of Conventions' provisions into national development planning" which was organized by the CB2 project (GEF/CB2/ UNDP & MoEnv.) made available a good opportunity to meet with biodiversity stakeholders and discuss prioritization of research for various thematic areas of biodiversity. In addition, the evaluation process considered the areas of the national Rio policies priorities of biodiversity that were presented, discussed and amended during the CB-2 training workshop. The priorities include the following:

- Network of protected areas
- Biodiversity important areas.
- Ecosystem approach.
- Ecosystem rehabilitation.
- Ecosystem services.
- Sustainable use and improving livelihood.
- Access and benefit sharing of genetic resources.
- Protection of endangered species.
- Reduction of the rate of habitat degradation.
- Invasive species.
- Protection of fragile habitat.
- Enhancing the science base.
- Biosafety approach.
- Conservation techniques.
- Regional cooperation
- Gender mainstreaming
- Biodiversity important to food security.

The evaluation results show that policy-oriented research areas of priority are those relevant to developing legislations and regulations and management of the biodiversity important areas and hotspots are of high research priorities. . Also monitoring, measuring and evaluating the impact of climate change and desertification on biodiversity are of high research priorities. The climate change, agricultural biodiversity, mountain biodiversity, protected areas and fragile habitat and vulnerability were highly represented in research priorities, which reflect the needs of the BNSAP, the HCST study, and the NCSA report. Results of the evaluation process for research priorities in the area of biodiversity are shown in Table 6c.

TABLE 6C: STAKEHOLDERS EVALUATION RESULTS FOR RESEARCH PRIORITIES IN THE AREA OF BIODIVERSITY

Prioritized biodiversity research topics	Overall score
2.9 Developing national genetic resources strategy and regulations	81.4
1.8 Monitor, measure and evaluate the climate change and desertification on biodiversity components	81.0
4.12 Protect wildlife and completing the protected area networks.	80.6
1.9 Monitor, measure and evaluate the effectiveness of adaptation activities toward climate change and desertification.	80.2
9.1 Developing a national database for Jordan flora and fauna.	80.2
3.5 Conservation of wild life through ecosystem management	80.0
4.6 Maintenance of forest species combinations and ecosystem services	80.0
4.11 Enforce and activate legislations and regulations relevant to forest ecosystem.	80.0
5.1 Identification and management hotspots in mountain regions (e.g. ecosystem diversity, species richness, endemic and endangered species, genetic diversity of crop, livestock, and their wild relatives)	80.0
3.7 Develop legislation relevant to land ownership and rangeland use.	79.8
4.5 Conservation ecosystem and reduce industrial and urbanization activities	79.8
8.2 Frequent environment monitoring and protection in Jordan through the provision of an online real-time data collection platform	79.8
3.12 Enhancement the role of woman as a traditional leadership in the Beduine society in biodiversity protection	79.4
3.13 Enhance medicinal and herbal production as supplementary income to poor communities.	79.4
7.1 Advocate local communities to re-establish, develop and implement traditional approaches to conserve and sustain the use of the biological diversity of inland water ecosystems	79.4
8.1 Establishment of rangeland reserves on public lands to be managed by cooperative societies of livestock breeders, living in the reserve areas	79.4
5.6 Enforce and activate legislations and regulations relevant to forest ecosystem.	79.0
2.10 Addressing the value of biodiversity and genetic resources on agricultural development and food security	78.8
5.7 Protect mountain vegetation from invasive of alien species.	78.8
6.5 Build corporation with governmental organization, NGOs and local communities to protect marine ecosystem.	78.6
1.6 Drought prediction and impacts on biodiversity and genetic resources.	78.4
2.11 Adopting and disseminating regulations of GMOs	78.4
3.9 Advocate natural reserves and protected areas	78.4
4.2 Documentation of traditional knowledge related to forest biodiversity.	78.2
5.5 Advocate socio-economical programs for sustainability of mountain ecological system	78.2
1.4 Develop, adopt a policy instrument, and commence implementing an effective, participatory and updated national biodiversity strategy and action plan that copes with climate change	77.8
2.1 Collection, conservation and characterization of endangered local genetic resources.	77.8
4.4 Propagation and production of forest and range plants.	77.6

4.8 Assess vulnerability and fragmentation and adopt in situ conservation techniques like corridors	77.6
5.3 Monitor fragility of mountain ecosystems and species and their vulnerability to human and natural disturbances	77.4
7.4 Understanding roles of wetlands in climate change regulation (i.e. through sequestering and releasing a major proportion of fixed carbon in the biosphere).	77.2
6.1 Identification of marine species and understanding marine ecosystem.	76.8
4.3 Rehabilitation approaches of forests areas.	76.6
7.5 Developing and upgrading a data bank for groundwater and surface water basins in Jordan.	76.6
1.1 Utilization of genetic resources to mitigate impact of climate change and combat drought.	76.4
4.7 Identifying and characterizing forest species and their specific habitats (niches) and hot spots.	76.4
1.7 Build capacities and involve local and indigenous communities in management programs of biodiversity protection and sustainable use of natural resource	76.2
2.5 Utilization of Jordanian genetic resources and landraces to mitigate impact of climate change and desertification	76.0
6.3 Assess value of marine biodiversity	76.0
1.3 Ecosystem-based Adaptation (Restoration and rehabilitation of ecosystems using proper techniques and local species)	75.8
2.3 Develop agrobiodiversity system to conserve and sustainably use local varieties, landraces and livestock	75.4
9.2 Complete flora of Jordan.	75.4
2.2 Establishing national gene bank.	75.0
3.14 Drought prediction and impacts on natural resources and ecology	74.8
6.2 Corel reef conservation	74.8
5.2 Protect mountain ecosystem from soil erosion and constructions	74.6
3.8 Monitor, measure, and frequent assessment of vegetation cover	74.0
1.11 Establishing national centre for biodiversity research and technology transfer	73.8
2.6 Identification and characterization of indigenous genetic resources in Jordan and their use using biotechnology.	73.6
1.12 Integrated information database for biodiversity risk assessment.	73.2
5.8 Understanding upland-lowland interactions and emphasizing the relevance of upland ecosystems for the management of food, water and soil resources	72.8
2.8 Participate public and research communities in conservation of Biodiversity.	72.4
4.9 Forest evaluation as a touristic and environmental resource.	72.4
4.10 Effect of deforestation on biodiversity	72.0
5.9 Sustainable utilization of medicinal and herbal plant diversity designated by MHP project.	72.0
4.1 Remote sensing and GIS modelling for studying rainfall influences on forests.	71.8
3.4 Assessment of rangeland degradation and rehabilitation.	71.6
1.5 Conservation and maintaining species and genetic stock in zoos, aquaria and gene banks.	70.0
1.10 Spatial and temporal analysis for biodiversity variability	69.6
2.12 Domestication of local wild genetic resources	69.4
7.2 Identification of wetland biodiversity.	69.0
2.7 Participate farmers and local communities in the process of sustainable utilization of biodiversity component	68.4
3.1 Characterization of biological content of arid and semiarid areas.	68.0
7.6 Improve wetland ecosystem such as mangroves and river floodplains to mitigating the impacts of extreme weather events.	66.6

5.4 Establishment of green belts and botanic garden.	65.4
6.4 Enhance marine eco-tourism	65.0
2.4 Developing Agrobiodiversity phase II project (to follow up the outcomes of Agrobiodiversity phase I).	64.0
3.6 Livestock and breed conservation	63.8
3.11 Arrangement of postural system and grazing	63.8
1.2 link between climate change and extinction risks	63.4
3.2 Vegetation cover modelling in relation to climate change impacts.	63.0
5.10 Environmental impact assessment of oil shale mining methods.	61.8
3.10 Impact of water harvesting on biological diversity	61.6
7.3 Survey and evaluation of land and water resources.	59.8

Colour index of reach categories

1. Climate change and Desertification
2. Agricultural biodiversity
3. Dry and sub-humid lands biodiversity
4. Forest biodiversity
5. Mountain biodiversity
6. Marine and coastal biodiversity
7. Inland water biodiversity
8. Protected areas
9. Taxonomy

2.4. Summary of Research Priorities, Guidelines, Procedures and Tools

Different research guidelines, procedures and tools can be used to support the implementation of the Rio Conventions in Jordan. These include models, methods, activities, instruments, and devices used to facilitate implementing the sought policy-oriented research. These tools were extracted and developed from the latest developments in applied climate change, desertification and biodiversity disciplines to help scientists carry out such investigations and research works. Such tools could be:

- Data banking: All necessary data for each research field as derived previously for GH inventory, vulnerability analyses, adaptation measures, etc. For example, weather and hydrological parameters, data of sectoral contributions to GHGs, data of related CC articles, remote sensing data of earth observation systems, drought networks data, and climatic records.

- Modeling assessments: This may include several international and national models developed by research communities and organizations used for mapping and assessment of CC inventory, impacts, vulnerability, mitigation and adaptation research fields as GCM, Decision Support Systems, Runoff simulators. In the field of desertification, models for drought indices, soil erosion by wind, soil erosion by water and models for assessing vegetation and soil conditions.

- Global data networks which may include global, regional and sub-regional datasets.

2.4.1. Summary of climate change research priorities, guidelines, procedures and tools

The updated reports of the Subsidiary Body for Scientific and Technological Advice, SBSTA for the climate change were reviewed, reflected and integrated to the activities, procedures, methods, and tools of developing policy-oriented research. According to research areas allocated for climate change theme, Table 7 shows the main guidelines, procedures and tools that are useful for any institutional/NGO/private sector researcher. The tools represent: a) Modeling assessments: This may include several international and national models developed by research communities and organizations used for mapping and assessment of climate change inventory, impacts, vulnerability, mitigation and adaptation research fields as GCM, Decision Support Systems, runoff simulators, etc, b) Data banking: All necessary data for each research field as derived previously for GHGs inventory, vulnerability analyses, adaptation measures, etc, and c) Global data networks. In addition Annex 1 provides a description of the tools specified within the tools table.

TABLE 7: SUMMARY OF CLIMATE CHANGE RESEARCH PRIORITIES, GUIDELINES, PROCEDURES AND TOOLS[5]

Overall Rank and Score of Prioritized Climate Change Research Topics		CLIMATE CHANGE Topic Prioritized (Policy-oriented *Research* Needed to Address National Gaps)	Article in Conventions/National Policy	Mandate	Provisions / Main Themes	Specific obligation to Jordan in Conventions	National Legislation Gap (as of before developing the cc Policy)	Specific Research Sub-Guidelines	Specific Research Sub-Procedures	Research Tools	Gender Mainstreaming	Synergies
Overall Rank	Score											
1	83.1	Vulnerability and adaptation assessment of climate change on agriculture sector.	**UNFCCC article 4e COP13 COP16; National Climate Change Policy of Jordan**	**Commitments / Impact, Vulnerability and Adaptation**	Cooperate in preparing for adaptation to the impacts of climate change; develop and elaborate appropriate and integrated plans for coastal zone management, water resources and agriculture, and for the protection and rehabilitation of areas, particularly in Africa,	Obligated only upon existence of fund	Well established laws and policies exist at the MWI; however, updates are required especially concerning risk analysis. On the other hand, the agricultural part needs inclusion for many	• Guidelines for the preparation of national adaptation programmes of action FCCC/CP/2001/13/Add.4 • Annotated guidelines for the preparation of national adaptation programmes of action, Least Developed Countries Expert Group, July 2002 • IPCC Technical Guidelines for Assessing Climate Change Impacts and	• The implementation of soil management and supervised irrigation practices, conservation agriculture, water harvesting, supervised irrigation with treated wastewater, the use of crop varieties with appropriate vernalization, community-based management of rangeland resources may tolerate agriculture sector with against CC impacts.	• Crop data • Impacts data • Policies and regulations • Same tools used for defining impacts • Computer based software as: Decision Support System for Agrotechnology Transfer (DSSAT) and CropWat	• Gender building capacity, • Perform awareness programs and training in vulnerability and adaptation assessment of climate change on agricultural sector, • Bottom-up participation of gender to policies through local communities, • Gender empowerment in risk assessments analysis, • Gender	Synergy with biodiversity through vegetation, in-situ and ex-situ conservation, rehabilitation, sustainable use of components of biological diversity, biotechnology and risk management Synergy with desertification through wind erosion, carbon loads, land management, mapping and mitigation of droughts,

[5] The original table submitted by the consultant in February 2012 included only potential climate change research areas extracted from the provisions and obligations in the UNFCCC. However, after developing a National Climate Change Policy for Jordan for the first time in February 2013, the CB-2 Project Manager integrated in this table potential climate change research areas extracted from the provisions of the Policy.

Overall Rank and Score of Prioritized Climate Change Research Topics		CLIMATE CHANGE Topic Prioritized (Policy-oriented *Research* Needed to Address National Gaps)	Article in Conventions/National Policy	Mandate	Provisions / Main Themes	Specific obligation to Jordan in Conventions	National Legislation Gap (as of before developing the cc Policy)	Specific Research Sub-Guidelines	Specific Research Sub-Procedures	Research Tools	Gender Mainstreaming	Synergies
Overall Rank	Score											
					affected by drought and desertification, as well as floods. This include risk management and risk reduction strategies, including risk sharing and transfer mechanisms such as insurance; disaster reduction strategies and means to address loss and damage associated with climate change impacts in developing countries that are particularly vulnerable to the adverse effects of		missing points.	Adaptations • General Guidelines On The Use Of Scenario Data For Climate Impact And Adaptation Assessment, Task Group on Data and Scenario Support for Impact and Climate Assessment (TGICA), IPCC, 2007. • Review the newly developed Climate Change Policy of Jordan for details on national needs in this regard.	• Vulnerability analysis using (i) Global social systems, (ii) Regional systems, (iii) Global biological systems, (iv) Geophysical systems, and (v) Extreme events • Assessment of adaptation costs and benefits • Assessment of adaptation capacity, options and constraints • Scenario-based approach • Risk assessments analysis • Selection of Crops • Crop Modeling • Adaptation, Alternatives and Evaluation		participation through workshops. • Women access to perform research and application vulnerability and adaptation assessment of climate change on agricultural sector and access funds through small and large projects.	rehabilitation and restoration of degraded ecosystems, Sustainable irrigation programs, water management, use of alternative and renewable energy sources, and risk management

Overall Rank and Score of Prioritized Climate Change Research Topics		CLIMATE CHANGE Topic Prioritized (Policy-oriented *Research* Needed to Address National Gaps)	Article in Conventions/National Policy	Mandate	Provisions / Main Themes	Specific obligation to Jordan in Conventions	National Legislation Gap (as of before developing the cc Policy)	Specific Research Sub-Guidelines	Specific Research Sub-Procedures	Research Tools	Gender Mainstreaming	Synergies
Overall Rank	Score											
					climate change; and Economic diversification to build resilience;							
2	82.7	Vulnerability and adaptation assessment of climate change on water sector.	**UNFCCC article 4e COP13 COP16**	**Commitments / Impact, Vulnerability and Adaptation**	Cooperate in preparing for adaptation to the impacts of climate change; develop and elaborate appropriate and integrated plans for coastal zone management, water resources and agriculture, and for the protection and rehabilitation of areas, particularly in Africa, affected by drought and desertification, as well as	Obligated only upon existence of fund	Well established laws and policies exist at the MWI; however, updates are required especially concerning risk analysis. On the other hand, the agricultural part needs inclusion for many missing points.	• Guidelines for the preparation of national adaptation programmes of action FCCC/CP/2001/13/Add.4 • Annotated guidelines for the preparation of national adaptation programmes of action, Least Developed Countries Expert Group, July 2002 • IPCC Technical Guidelines for Assessing Climate Change Impacts and Adaptations • General Guidelines On The Use Of	• Vulnerabilities identified using the following criteria (i) magnitude of impacts, (ii) timing of impacts, (iii) persistence and reversibility of impacts, (iv) likelihood (estimates of uncertainty) of impacts and vulnerabilities, and confidence in those estimates, (v) potential for adaptation, (vi) distributional aspects of impacts and vulnerabilities, and (vii) importance of the system(s) at risk. • Water resources could be adapt against CC through	• Computer based software as: Groundwater Modeling System (GMS), Surface water Modeling System (SMS), and Watershed Modeling System (WMS), Inverse modeling of water resources RISK, MIKE Basin, Variable Infiltration Capacity (VIC) Macro scale Hydrologic Model.	• Gender building capacity, • Perform awareness programs and training in vulnerability and adaptation assessment of climate change on water sector, • Bottom-up participation of gender to policies through local communities, • Gender empowerment in risk assessments analysis, • Gender participation through workshops. • Women access to perform	No

Overall Rank and Score of Prioritized Climate Change Research Topics		CLIMATE CHANGE Topic Prioritized (Policy-oriented *Research* Needed to Address National Gaps)	Article in Conventions/National Policy	Mandate	Provisions / Main Themes	Specific obligation to Jordan in Conventions	National Legislation Gap (as of before developing the cc Policy)	Specific Research Sub-Guidelines	Specific Research Sub-Procedures	Research Tools	Gender Mainstreaming	Synergies
Overall Rank	Score											
					floods. This include risk management and risk reduction strategies, including risk sharing and transfer mechanisms such as insurance; disaster reduction strategies and means to address loss and damage associated with climate change impacts in developing countries that are particularly vulnerable to the adverse effects of climate change; and Economic diversificatio			Scenario Data For Climate Impact And Adaptation Assessment, Task Group on Data and Scenario Support for Impact and Climate Assessment (TGICA), IPCC, 2007. • Review the newly developed Climate Change Policy of Jordan for details on national needs in this regard.	the following: (i) Management and development for residential water supply, surface water, groundwater, non-conventional water resources, brackish water, (ii) Protection and monitoring of water quality, water resources and the environment, (iii) Domestic, Industrial wastewater management, (iv) Improvement of system efficiency, urban water use, and flood control, and (v) Development of socio – economic issues, behaviour and ethics • Determining which impacts of climate change are potentially 'key' and what is 'dangerous.	• Same tools used for defining impacts.	research and application vulnerability and adaptation assessment of climate change on water sector and access funds through small and large projects.	

Overall Rank and Score of Prioritized Climate Change Research Topics		CLIMATE CHANGE Topic Prioritized (Policy-oriented *Research* Needed to Address National Gaps)	Article in Conventions/National Policy	Mandate	Provisions / Main Themes	Specific obligation to Jordan in Conventions	National Legislation Gap (as of before developing the cc Policy)	Specific Research Sub-Guidelines	Specific Research Sub-Procedures	Research Tools	Gender Mainstreaming	Synergies
Overall Rank	Score											
					n to build resilience;				• Vulnerability analysis using (i) Global social systems, (ii) Regional systems, (iii) Global biological systems, (iv) Geophysical systems, and (v) Extreme events • Hydrological modeling as modeling of runoff and GW recharge. • Assessing and implications of the projected impacts of climate change on surface runoff using regional models and downscaling models. • Risk assessments analysis • Assessment of adaptation costs and benefits. • Assessment of adaptation capacity, options and constraints. • Scenario-based approach			

Overall Rank and Score of Prioritized Climate Change Research Topics		CLIMATE CHANGE Topic Prioritized (Policy-oriented *Research* Needed to Address National Gaps)	Article in Conventions/National Policy	Mandate	Provisions / Main Themes	Specific obligation to Jordan in Conventions	National Legislation Gap (as of before developing the cc Policy)	Specific Research Sub-Guidelines	Specific Research Sub-Procedures	Research Tools	Gender Mainstreaming	Synergies
Overall Rank	Score											
									• Cross-sectoral integration			
3	80.0	Observation, monitoring and estimation of CC impacts on agriculture and food security (solutions to limited data availability, lack of models and tools specifically designed for local conditions).	**UNFCCC article 4e COP13 COP16**	**Commitments / Impact, Vulnerability and Adaptation**	Cooperate in preparing for adaptation to the impacts of climate change; develop and elaborate appropriate and integrated plans for coastal zone management, water resources and agriculture, and for the protection and rehabilitation of areas, particularly in Africa, affected by drought and desertification, as well as floods. This include risk	Obligated only upon existence of fund	Well established laws and policies exist at the MWI; however, updates are required especially concerning risk analysis. On the other hand, the agricultural part needs inclusion for many missing points.	• Since severe impacts of CC on food security are noticeable, increased drought effects and accelerated soil degradation, overgrazing of natural vegetation, reduction of rainfed lands and a shift towards irrigated agriculture are expected. • Defining the impact trends and alternatives for food production according to climatic zones. • Advance modelling for the degree of impacts specifies the degree of	• Spatial and temporal tend analysis of climatic data • Decision Support System and crop modeling • Baseline climate scenarios • Land-use scenarios using LULC and LULCH • Climate Change Scenarios • Incremental Scenarios • Integrated Assessment Models (IAMs) • Regional-scale economic models. • Technology scenarios such as agricultural production, water management, or climate regulation	• Changes in crop phenology, Management practices, pests and diseases, Yields, Livestock. • Forest area and disturbance regime data. • Field crops, animal, fodder production and forestry conservation activities data • Long time LULC maps • Satellite and Arial photos • LULCC maps • Computer based programs as DSAT, MODIS/NDVI, CropWat	• Gender building capacity, • Perform awareness programs and training in observation, monitoring and estimation of CC impacts on agriculture and food security, • Gender empowerment in performing CC impacts studies on agriculture and food security, • Bottom-up participation of gender to policies through residential and local communities, • Promote women's equal access to land ownership and other resources needed for	Synergy with biodiversity through vegetation, in-situ and ex-situ conservation, rehabilitation, sustainable use of components of biological diversity, and biotechnology Synergy with desertification through carbon sequestration, land management, and use of alternative and renewable energy sources

Overall Rank and Score of Prioritized Climate Change Research Topics		CLIMATE CHANGE Topic Prioritized (Policy-oriented *Research* Needed to Address National Gaps)	Article in Conventions/National Policy	Mandate	Provisions / Main Themes	Specific obligation to Jordan in Conventions	National Legislation Gap (as of before developing the cc Policy)	Specific Research Sub-Guidelines	Specific Research Sub-Procedures	Research Tools	Gender Mainstreaming	Synergies
Overall Rank	Score											
					management and risk reduction strategies, including risk sharing and transfer mechanisms such as insurance; disaster reduction strategies and means to address loss and damage associated with climate change impacts in developing countries that are particularly vulnerable to the adverse effects of climate change; and Economic diversification to build resilience;			impacts and simplifies the selection of alternatives. • IPCC Technical Guidelines for Assessing Climate Change Impacts and Adaptations • General Guidelines On The Use Of Scenario Data For Climate Impact And Adaptation Assessment, Task Group on Data and Scenario Support for Impact and Climate Assessment (TGICA), IPCC, 2007. • Review the newly developed Climate Change Policy of Jordan for details on national needs			effective socio-economic participation, such as capital, technical assistance, technology, tools, equipment, markets and time. • Gender participation through workshops. • Women access to perform research and application studies in estimation of CC impacts on agriculture and food security and access funds through small and large projects.	

Overall Rank and Score of Prioritized Climate Change Research Topics		CLIMATE CHANGE Topic Prioritized (Policy-oriented *Research* Needed to Address National Gaps)	Article in Conventions/National Policy	Mandate	Provisions / Main Themes	Specific obligation to Jordan in Conventions	National Legislation Gap (as of before developing the cc Policy)	Specific Research Sub-Guidelines	Specific Research Sub-Procedures	Research Tools	Gender Mainstreaming	Synergies
Overall Rank	Score											
								in this regard.				
4	79.0	Observation, monitoring and estimation of CC impacts on water sector (solutions to limited data availability, lack of models and tools specifically designed for local conditions; improve meteorological and water monitoring through modernization of equipment and extension of monitoring	**UNFCCC article 4e COP13 COP16**	**Commitments / Impact, Vulnerability and Adaptation**	Cooperate in preparing for adaptation to the impacts of climate change; develop and elaborate appropriate and integrated plans for coastal zone management, water resources and agriculture, and for the protection and rehabilitation of areas, particularly in Africa, affected by drought and desertification, as well as floods. This include risk management	Obligated only upon existence of fund	Well established laws and policies exist at the MWI; however, updates are required especially concerning risk analysis. On the other hand, the agricultural part needs inclusion for many missing points.	• IPCC Special Report on Emissions Scenarios (SRES) • IPCC Technical Guidelines for Assessing Climate Change Impacts and Adaptations • General Guidelines On The Use Of Scenario Data For Climate Impact And Adaptation Assessment, Task Group on Data and Scenario Support for Impact and Climate Assessment (TGICA), IPCC, 2007. • Review the newly developed Climate Change Policy of Jordan	CC have a severe impacts on water by either increasing flood events and/or reducing groundwater recharge levels • CC impacts can be detected through changes in surface and groundwater systems, and through Floods and droughts analysis. • Spatial and temporal tend analysis of climatic and hydrological variables • Stream flow analysis • General Circulation Models (GCMs) and Regional Climate Models (RCMs) • Vulnerability maps • Baseline climate scenarios • Climate Change Scenarios	• Long term meteorological data • Long water quantity and quality data by basin • Long water human water use data • Water availability and stress analysis • Erosion and sediment transport • Satellite and Arial photos • DEM maps • Watershed Modelling Systems • Computer based software as: Wetspa, Mudflow, Groundwater Modeling System (GMS), Surface	• Gender building capacity, • Perform awareness programs and training in observation, monitoring and estimation of CC impacts on water sector, • Gender empowerment in estimation of CC impacts on water sector, • Bottom-up participation of gender to policies through residential and local communities, • Gender participation through workshops. • Women access to perform research and application studies in estimation of CC	No

Overall Rank and Score of Prioritized Climate Change Research Topics		CLIMATE CHANGE Topic Prioritized (Policy-oriented *Research* Needed to Address National Gaps)	Article in Conventions/National Policy	Mandate	Provisions / Main Themes	Specific obligation to Jordan in Conventions	National Legislation Gap (as of before developing the cc Policy)	Specific Research Sub-Guidelines	Specific Research Sub-Procedures	Research Tools	Gender Mainstreaming	Synergies
Overall Rank	Score											
		networks; Raising technical capacity for monitoring and data collection, data management and updating of basic data sets, and preparation of basic maps and databases.			and risk reduction strategies, including risk sharing and transfer mechanisms such as insurance; disaster reduction strategies and means to address loss and damage associated with climate change impacts in developing countries that are particularly vulnerable to the adverse effects of climate change; and Economic diversification to build resilience;			for details on national needs in this regard.	• Incremental Scenarios • Palmer Drought Severity Index • Reduce or eliminate the remaining uncertainties regarding the causes, effects, magnitude and timing of climate change and the economic and social consequences of various response strategies • Implementation of hydrological studies in surface and ground aquifers using advance water flow modelling systems and IWRM.	water Modeling System (SMS), and Watershed Modeling System (WMS), and IHACRES	impacts on water sector and access funds through small and large projects.	
5	78.9	Desertification and	**UNFCCC article**	**Commitments /**	Cooperate in preparing for adaptation to	Obligated only	Well established	• General Guidelines On The Use Of	• Climate change, biodiversity and desertification	• Soil erosion and land degradation	• Gender building capacity,	Synergy with biodiversity through

Overall Rank and Score of Prioritized Climate Change Research Topics		CLIMATE CHANGE Topic Prioritized (Policy-oriented *Research* Needed to Address National Gaps)	Article in Conventions/National Policy	Mandate	Provisions / Main Themes	Specific obligation to Jordan in Conventions	National Legislation Gap (as of before developing the cc Policy)	Specific Research Sub-Guidelines	Specific Research Sub-Procedures	Research Tools	Gender Mainstreaming	Synergies
Overall Rank	Score											
		biodiversity interactions with CC (solutions to limited data availability, lack of models and tools specifically designed for local conditions).	**4e COP13 COP16**	**Impact, Vulnerability and Adaptation**	the impacts of climate change; develop and elaborate appropriate and integrated plans for coastal zone management, water resources and agriculture, and for the protection and rehabilitation of areas, particularly in Africa, affected by drought and desertification, as well as floods. This include risk management and risk reduction strategies, including risk	upon existence of fund	laws and policies exist at the MEnv; however, updates are required especially concerning risk analysis. On the other hand, the agricultural part needs inclusion for many missing points.	Scenario Data For Climate Impact And Adaptation Assessment, Task Group on Data and Scenario Support for Impact and Climate Assessment (TGICA), IPCC, 2007. • Review the newly developed Climate Change Policy of Jordan for details on national needs in this regard.	interacts strongly especially at the soil carbon and soil erosion key factors • Desertification/land degradation and drought (DLDD) is a subsequent impact of climate change that can be addressed separately. • Biodiversity loss also can be addressed from climate change impacts	maps, SLM, P/PE and other indicators, • Remote sensing data and GIS based tools. • Soil Erosion models as (USLE, RUSLE, etc) • Ecological models and ground surveys • Soil, water and vegetation, LULC and LULUCF. • Soil quality. • Vegetation species, biomass and cover	• Perform awareness programs and training in desertification and biodiversity interactions with CC, • Bottom-up participation of gender to policies through local communities, • Gender participation through workshops. • Women access to perform research and application studies in synergies between the three Rio terms and access funds through small and large projects.	vegetation, in-situ and ex-situ conservation, rehabilitation, sustainable use of components of biological diversity, biotechnology and risk management Synergy with desertification through wind erosion, carbon sequestration, land management, mapping and mitigation of droughts, rehabilitation and restoration of degraded ecosystems, Sustainable irrigation programs, Water management, use of alternative and

Overall Rank and Score of Prioritized Climate Change Research Topics		CLIMATE CHANGE Topic Prioritized (Policy-oriented *Research* Needed to Address National Gaps)	Article in Conventions/National Policy	Mandate	Provisions / Main Themes	Specific obligation to Jordan in Conventions	National Legislation Gap (as of before developing the cc Policy)	Specific Research Sub-Guidelines	Specific Research Sub-Procedures	Research Tools	Gender Mainstreaming	Synergies
Overall Rank	Score											
					sharing and transfer mechanisms such as insurance; disaster reduction strategies and means to address loss and damage associated with climate change impacts in developing countries that are particularly vulnerable to the adverse effects of climate change; and Economic diversification to build resilience;							renewable energy sources, and Risk Management
6	78.8	Ecosystem-based adaptation and cost-effective (enhancing	**UNFCCC article 4e COP13 COP16**	**Commitments / Impact, Vulnerability and Adaptatio**	Cooperate in preparing for adaptation to the impacts of climate change; develop and	Obligated only upon existence of	Well established laws and policies exist at the MWI;	• Review the newly developed Climate Change Policy of Jordan for details on national needs	• awareness programs and trainings • Gender empowerment • Bottom-up	• GHG inventory data • Vulnerability and adaptation	• Gender building capacity, • Perform awareness programs and training in	Synergies with both desertification and biodiversity

Overall Rank and Score of Prioritized Climate Change Research Topics		CLIMATE CHANGE Topic Prioritized (Policy-oriented *Research* Needed to Address National Gaps)	Article in Conventions/National Policy	Mandate	Provisions / Main Themes	Specific obligation to Jordan in Conventions	National Legislation Gap (as of before developing the cc Policy)	Specific Research Sub-Guidelines	Specific Research Sub-Procedures	Research Tools	Gender Mainstreaming	Synergies
Overall Rank	Score											
		the resilience of ecosystems and natural habitats to the impacts of Climate Change).	**National Climate Change Policy for the Hashemite Kingdom of Jordan**	**n**	elaborate appropriate and integrated plans for coastal zone management, water resources and agriculture, and for the protection and rehabilitation of areas, particularly in Africa, affected by drought and desertification, as well as floods. This include risk management and risk reduction strategies, including risk sharing and transfer mechanisms such as	fund	however, updates are required especially concerning risk analysis. On the other hand, the agricultural part needs inclusion for many missing points.	in this regard.	participation of residential and local communities • Women access to perform research and application studies in estimation of CC impacts and access funds through small and large projects	options • Computer based programs • Cost analysis • Barriers and constrain analyses.	observation, monitoring and estimation of CC impacts, • Gender empowerment in estimation of CC impacts, • Bottom-up participation of gender to policies through residential and local communities, • Gender participation through workshops. • Women access to perform research and application studies in estimation of CC impacts and access funds through small and large projects.	

Overall Rank and Score of Prioritized Climate Change Research Topics		CLIMATE CHANGE Topic Prioritized (Policy-oriented *Research* Needed to Address National Gaps)	Article in Conventions/National Policy	Mandate	Provisions / Main Themes	Specific obligation to Jordan in Conventions	National Legislation Gap (as of before developing the cc Policy)	Specific Research Sub-Guidelines	Specific Research Sub-Procedures	Research Tools	Gender Mainstreaming	Synergies
Overall Rank	Score											
					insurance; disaster reduction strategies and means to address loss and damage associated with climate change impacts in developing countries that are particularly vulnerable to the adverse effects of climate change; and Economic diversification to build resilience;							
7	78.7	Vulnerability assessment of climate change on socio-economic sector (vulnerable groups with emphasis on the poor).	**UNFCCC article 4f COP8 COP13 COP16** **National Climate Change**	**Commitments / Socio-economic Impact Assessment**	Take climate change considerations into account, to the extent feasible, in their relevant social, economic and	Obligated only upon existence of fund	Impact assessment is missing and needs special inclusions at MoSD and MoH.	• General Guidelines On The Use Of Scenario Data For Climate Impact And Adaptation Assessment, Task Group on Data and Scenario	• Vulnerability analysis using (i) Global social systems, (ii) Regional systems, (iii) Global biological systems, (iv) Geophysical systems, and (v) Extreme events	• Same tools used for defining impacts • Gross National Income (GNI) per capita	• Gender building capacity, • Perform awareness programs and training in climate change impacts, adaptation and mitigation,	Only when it requires

Overall Rank and Score of Prioritized Climate Change Research Topics		CLIMATE CHANGE Topic Prioritized (Policy-oriented *Research* Needed to Address National Gaps)	Article in Conventions/National Policy	Mandate	Provisions / Main Themes	Specific obligation to Jordan in Conventions	National Legislation Gap (as of before developing the cc Policy)	Specific Research Sub-Guidelines	Specific Research Sub-Procedures	Research Tools	Gender Mainstreaming	Synergies
Overall Rank	Score											
			Policy for the Hashemite Kingdom of Jordan		environmental policies and actions, and employ appropriate methods, for example impact assessments, formulated and determined nationally, with a view to minimizing adverse effects on the economy, on public health and on the quality of the environment, of projects or measures undertaken by them to mitigate or adapt to climate change			Support for Impact and Climate Assessment (TGICA), IPCC, 2007. • UNFCCC Guidelines: Methods of Assessing Human Health Vulnerability and Public Health Adaptation to Climate Change. • Review the newly developed Climate Change Policy of Jordan for details on national needs in this regard.	• Assessment of adaptation costs and benefits • Assessment of adaptation capacity, options and constraints • Scenario-based approach • Modifying governmental policies, including taxes and regulations, encourage certain economic and social activities and discourage others.		• Bottom-up participation of gender to policies through local communities, • Use of gender-sensitive criteria and indicators to improve their knowledge, • Perform gender-sensitive statistics in relevance and efficiency for addressing gender environment issues, • Govern the basis of full and equitable participation, accountability, transparency and equality for sustainable development • Gender participation through workshops. • Women access	

Overall Rank and Score of Prioritized Climate Change Research Topics		CLIMATE CHANGE Topic Prioritized (Policy-oriented *Research* Needed to Address National Gaps)	Article in Conventions/National Policy	Mandate	Provisions / Main Themes	Specific obligation to Jordan in Conventions	National Legislation Gap (as of before developing the cc Policy)	Specific Research Sub-Guidelines	Specific Research Sub-Procedures	Research Tools	Gender Mainstreaming	Synergies
Overall Rank	Score											
											to perform research and access funds through small and large projects.	
8	76.7	Integrate climate change in current legislative and policy framework.	**UNFCCC articles 3, 4 COP4, COP5, COP6, COP7** **National Climate Change Policy for the Hashemite Kingdom of Jordan**	**Climate Change Legal and Institutional Framework**	Policies and measures to protect the climate system against human-induced change should be appropriate for the specific conditions of each Party and should be integrated with national development programmes, taking into account that economic development is essential for adopting measures to address climate	Obligated only upon existence of fund	Climate change have been incorporated in many educational stages and training and awareness programs have been conducted at variable levels, however, corporation of NIS, MoP, MoHE and MoEnv is required.	• Develop legislative and institutional framework • Upgrade of legislation and policies. • Institutional and political settings of the problem define the framework required to integrate climate change into policies. • Explanations of the political dimensions of desertification imply different strategies for combating it. • Review the newly developed Climate Change Policy of Jordan	• Economical models. • Analysis of policy under economic development theories. • Barriers and constrains analyses. • Cross cutting and priorities options. •	• National economies, administration and laws. • Socioeconomic data • All data of GHG inventory, impact, vulnerability, mitigation, adaptation, etc		Only when it requires

Overall Rank and Score of Prioritized Climate Change Research Topics		CLIMATE CHANGE Topic Prioritized (Policy-oriented *Research* Needed to Address National Gaps)	Article in Conventions/National Policy	Mandate	Provisions / Main Themes	Specific obligation to Jordan in Conventions	National Legislation Gap (as of before developing the cc Policy)	Specific Research Sub-Guidelines	Specific Research Sub-Procedures	Research Tools	Gender Mainstreaming	Synergies
Overall Rank	Score											
					change.			for details on national needs in this regard.				
9	76.4	Enhance public awareness and training in climate change related issues.	**UNFCCC articles 4, 6 COP4, COP5, COP6, COP7**	**Research, Systematic Observation, Education, Training and Public Awareness.**	○ Promote and facilitate at the national and, as appropriate, subregional and regional levels, and in accordance with national laws and regulations, and within their respective capacities: a. the development and implementation of educational and public awarene	Direct Obligation	Climate change have been incorporated in many educational stages and training and awareness programs have been conducted at variable levels, however, corporation of NIS, MoP, MoHE and MoEnv is required.	• Promoting and facilitating capacities in the development and implementation of educational and public awareness programmes on climate change and its effects will improve public awareness • Also public awareness and training in climate change related issues can be improved through Implementation of training programs and public awareness campaigns; Local community	• Survey analyses for public awareness in climate change issues within communities • Counting the training programs adopted by each ministry in relevance to climate change • Ground surveys. • Rural diagnosis and appraisals. • Analogue models.	• Herding methods. • Herd size and structure. • Climate change and carrying capacity.	• Assist institutions working on sustainable development to improve the gender mainstreaming mechanisms • Include specific gender mainstreaming tools undertaken by governments or civil society organizations, such as gender-responsive budgeting exercise • Support thematic expertise on gender issue, availability of gender-disaggregated information, and staff accountability mechanisms for	With all

Overall Rank and Score of Prioritized Climate Change Research Topics		CLIMATE CHANGE Topic Prioritized (Policy-oriented *Research* Needed to Address National Gaps)	Article in Conventions/National Policy	Mandate	Provisions / Main Themes	Specific obligation to Jordan in Conventions	National Legislation Gap (as of before developing the cc Policy)	Specific Research Sub-Guidelines	Specific Research Sub-Procedures	Research Tools	Gender Mainstreaming	Synergies
Overall Rank	Score											
					ss programmes on climate change and its effects; b. public access to information on climate change and its effects; c. public participation in addressing climate change and its effects and developing adequate responses; d. training of scientific, technical and manageri			involvement; Improve NGO participation; and Improvement of extension services and awareness campaigns. • Review the newly developed Climate Change Policy of Jordan for details on national needs in this regard.			gender mainstreaming • Training women in methods for increasing their productivity with new technologies as nurseries, site selection, species selection, land preparation, sowing, weeding, and maintenance. • Include gender approach in bioenergy policy-making and planning • Gender participation through workshops.	

Overall Rank and Score of Prioritized Climate Change Research Topics		CLIMATE CHANGE Topic Prioritized (Policy-oriented *Research* Needed to Address National Gaps)	Article in Conventions/National Policy	Mandate	Provisions / Main Themes	Specific obligation to Jordan in Conventions	National Legislation Gap (as of before developing the cc Policy)	Specific Research Sub-Guidelines	Specific Research Sub-Procedures	Research Tools	Gender Mainstreaming	Synergies
Overall Rank	Score											
					al personnel; ○ Cooperate in and promote, at the international level, and, where appropriate, using existing bodies: a. the development and exchange of educational and public awareness material on climate change and its effects; and b. the development and implementation of education and training							

Overall Rank and Score of Prioritized Climate Change Research Topics		CLIMATE CHANGE Topic Prioritized (Policy-oriented *Research* Needed to Address National Gaps)	Article in Conventions/National Policy	Mandate	Provisions / Main Themes	Specific obligation to Jordan in Conventions	National Legislation Gap (as of before developing the cc Policy)	Specific Research Sub-Guidelines	Specific Research Sub-Procedures	Research Tools	Gender Mainstreaming	Synergies
Overall Rank	Score											
					programmes, including the strengthening of national institutions and the exchange or secondment of personnel to train experts in this field, in particular for developing countries.							
10	75.4	Vulnerability assessment of climate change on socio-economic sector (vulnerable groups with emphasis on gender mainstreaming).	**UNFCCC article 4f COP8 COP13 COP16** **National Climate Change Policy for the Hashemi**	**Commitments / Socio-economic Impact Assessment**	Take climate change considerations into account, to the extent feasible, in their relevant social, economic and environmental policies and actions,	Obligated only upon existence of fund	Impact assessment is missing and needs special inclusions at MoSD and MoH.	• General Guidelines On The Use Of Scenario Data For Climate Impact And Adaptation Assessment, Task Group on Data and Scenario Support for Impact and Climate	• Vulnerability analysis using (i) Global social systems, (ii) Regional systems, (iii) Global biological systems, (iv) Geophysical systems, and (v) Extreme events • Assessment of adaptation costs and benefits	• Same tools used for defining impacts • Gross National Income (GNI) per capita	• Gender building capacity, • Perform awareness programs and training in climate change impacts, adaptation and mitigation, • Bottom-up participation of gender to	Only when it requires

Overall Rank and Score of Prioritized Climate Change Research Topics		CLIMATE CHANGE Topic Prioritized (Policy-oriented *Research* Needed to Address National Gaps)	Article in Conventions/National Policy	Mandate	Provisions / Main Themes	Specific obligation to Jordan in Conventions	National Legislation Gap (as of before developing the cc Policy)	Specific Research Sub-Guidelines	Specific Research Sub-Procedures	Research Tools	Gender Mainstreaming	Synergies
Overall Rank	Score											
			te Kingdom of Jordan		and employ appropriate methods, for example impact assessments, formulated and determined nationally, with a view to minimizing adverse effects on the economy, on public health and on the quality of the environment, of projects or measures undertaken by them to mitigate or adapt to climate change			Assessment (TGICA), IPCC, 2007. • UNFCCC Guidelines: Methods of Assessing Human Health Vulnerability and Public Health Adaptation to Climate Change. • Review the newly developed Climate Change Policy of Jordan for details on national needs in this regard.	• Assessment of adaptation capacity, options and constraints • Scenario-based approach • Modifying governmental policies, including taxes and regulations, encourage certain economic and social activities and discourage others.		policies through local communities, • Use of gender-sensitive criteria and indicators to improve their knowledge, • Perform gender-sensitive statistics in relevance and efficiency for addressing gender environment issues, • Govern the basis of full and equitable participation, accountability, transparency and equality for sustainable development • Gender participation through workshops. • Women access to perform research and access funds	

Overall Rank and Score of Prioritized Climate Change Research Topics		CLIMATE CHANGE Topic Prioritized (Policy-oriented *Research* Needed to Address National Gaps)	Article in Conventions/National Policy	Mandate	Provisions / Main Themes	Specific obligation to Jordan in Conventions	National Legislation Gap (as of before developing the cc Policy)	Specific Research Sub-Guidelines	Specific Research Sub-Procedures	Research Tools	Gender Mainstreaming	Synergies
Overall Rank	Score											
											through small and large projects.	
11	75.3	Promote and corporate climate change in education.	**UNFCCC articles 4, 6 COP4, COP5, COP6, COP7**	**Research, Systematic Observation, Education, Training and Public Awareness.**	Same as enhance public awareness and training in climate change related issues	Direct Obligation	Climate change have been incorporated in many educational stages and training and awareness programs have been conducted at variable levels, however, corporation of NIS, MoP, MoHE and MoEnv is required.	• Improve education involvement in CC awareness • Incorporate climate change into schools curricula deal with environmental concepts and national priorities and challenges in general and climate change issues in particular at some grades. • Incorporate climate change in higher education as the Jordanian Universities, to become special departments teaching environmental sciences and management	• Evaluation of the curricula aiming at better educating the students on climate change issues • Evaluation the knowledge and participation of higher education students at national universities over related issues in climate change • Educational survey for the climatic change issues	• National school and higher education curricula • Herding methods. • Herd size and structure. • Climate change and carrying capacity.	• Same as enhance public awareness and training in climate change related issues	With all

Overall Rank and Score of Prioritized Climate Change Research Topics		CLIMATE CHANGE Topic Prioritized (Policy-oriented *Research* Needed to Address National Gaps)	Article in Conventions/National Policy	Mandate	Provisions / Main Themes	Specific obligation to Jordan in Conventions	National Legislation Gap (as of before developing the cc Policy)	Specific Research Sub-Guidelines	Specific Research Sub-Procedures	Research Tools	Gender Mainstreaming	Synergies
Overall Rank	Score											
								and issues related to climate change. • Review the newly developed Climate Change Policy of Jordan for details on national needs in this regard.				
12	74.8	Obstacles hindering securing and mobilizing national and international financial resources to conduct studies to improve knowledge regarding climate change impacts and adaptation opportunities in Jordan (Securing	**UNFCCC article 4e COP13 COP16** **National Climate Change Policy for the Hashemite Kingdom of Jordan**	**Commitments / Impact, Vulnerability and Adaptation**		Obligated only upon existence of fund		• Review the newly developed Climate Change Policy of Jordan for details on national needs in this regard.	• awareness programs and trainings • Gender empowerment • Bottom-up participation of residential and local communities • Women access to perform research and application studies in estimation of CC impacts and access funds through small and large projects	• GHG inventory data • Vulnerability and adaptation options • Computer based programs • Cost analysis • Barriers and constrain analyses.	• Gender building capacity, • Perform awareness programs and training in observation, monitoring and estimation of CC impacts, • Gender empowerment in estimation of CC impacts, • Bottom-up participation of gender to policies through residential and local communities, • Gender participation	Synergies with both desertification and biodiversity

Overall Rank and Score of Prioritized Climate Change Research Topics		CLIMATE CHANGE Topic Prioritized (Policy-oriented *Research* Needed to Address National Gaps)	Article in Conventions/National Policy	Mandate	Provisions / Main Themes	Specific obligation to Jordan in Conventions	National Legislation Gap (as of before developing the cc Policy)	Specific Research Sub-Guidelines	Specific Research Sub-Procedures	Research Tools	Gender Mainstreaming	Synergies
Overall Rank	Score											
		and mobilizing financial resources to implement priority adaptation projects).									through workshops. • Women access to perform research and application studies in estimation of CC impacts and access funds through small and large projects.	
13	74.7	Increase of the percentage of electricity production from renewable sources (energy supply side).	**UNFCCC article 4b COP13 COP15 COP16**	**Commitments / GHG Mitigation**	Formulate, implement, publish and regularly update national and, where appropriate, regional programmes containing measures to mitigate climate change by addressing anthropogenic emissions by sources and removals by sinks of all GHGs not	Not an obligation (optional)	Well established strategies exist at at MoEnv, however MoA, strategies requires further inclusions.	• COP15 "Nationally appropriate mitigation actions of developing country Parties" FCCC/CP/2009/11/Add.1 • General Guidelines On The Use Of Scenario Data For Climate Impact And Adaptation Assessment, Task Group on Data and Scenario Support for	• GHGs emissions might be reduced by introducing of nuclear power plants, oil shale based power plants, providing sources of renewable energy and providing energy conservation techniques, • Means to enhance innovation in GHG abatement technologies and determinants of the rate of technological change;	• Legal and institutional framework Outputs of GHG inventory • Outputs of CC impacts • Direct and indirect economic impacts • New technologies for GHG stabilizations at local scale • National development goals • Implementati	• Gender empowerment in GHG abatement technologies, and Costs and benefits analysis • Gender access mitigation through workshops. • Women access to perform mitigation research and application for funds through small and large projects.	No

Overall Rank and Score of Prioritized Climate Change Research Topics		CLIMATE CHANGE Topic Prioritized (Policy-oriented *Research* Needed to Address National Gaps)	Article in Conventions/National Policy	Mandate	Provisions / Main Themes	Specific obligation to Jordan in Conventions	National Legislation Gap (as of before developing the cc Policy)	Specific Research Sub-Guidelines	Specific Research Sub-Procedures	Research Tools	Gender Mainstreaming	Synergies
Overall Rank	Score											
					controlled by the Montreal Protocol Integrity using markets to enhance the cost-effectiveness of, and to promote, mitigation actions through stimulating mitigation across broad segments of the economy, safeguarding environmental, and ensuring good governance and robust market functioning and regulation			Impact and Climate Assessment (TGICA), IPCC, 2007. • Review the newly developed Climate Change Policy of Jordan for details on national needs in this regard.	• Geographic distribution of renewable sources and analysis of their cost-effectiveness; • Small scale data modelling • Provide conservation and/or enhancement alternatives for GHGs • Baseline scenarios by sector and gas • Mitigation scenario options by sector and gas, options, their costs and the barriers to their implementation • Statistical and cost effective analyses, • Analysis of the ancillary benefits, the costs of damages, impacts of response measures, and constraints and opportunities for the adoption of	on policies • Sustainability options • Field evaluations and uncertainty • Market efficiency • Transaction and implementation costs		

Overall Rank and Score of Prioritized Climate Change Research Topics		CLIMATE CHANGE Topic Prioritized (Policy-oriented *Research* Needed to Address National Gaps)	Article in Conventions/National Policy	Mandate	Provisions / Main Themes	Specific obligation to Jordan in Conventions	National Legislation Gap (as of before developing the cc Policy)	Specific Research Sub-Guidelines	Specific Research Sub-Procedures	Research Tools	Gender Mainstreaming	Synergies
Overall Rank	Score											
									low GHG emitting technologies;			
14	74.7	Vulnerability and adaptation assessment of climate change on health sector.	**UNFCCC article 4f COP8 COP13 COP16**	**Commitments / Socio-economic Impact Assessment**	Take climate change considerations into account, to the extent feasible, in their relevant social, economic and environmental policies and actions, and employ appropriate methods, for example impact assessments, formulated and determined nationally, with a view to minimizing adverse effects on the economy, on public health and on the quality of the	Obligated only upon existence of fund	Impact assessment is missing and needs special inclusions at MoSD and MoH.	• General Guidelines On The Use Of Scenario Data For Climate Impact And Adaptation Assessment, Task Group on Data and Scenario Support for Impact and Climate Assessment (TGICA), IPCC, 2007. • UNFCCC Guidelines: Methods of Assessing Human Health Vulnerability and Public Health Adaptation to Climate Change. • Review the newly developed Climate Change Policy of Jordan	• Vulnerability analysis using (i) Global social systems, (ii) Regional systems, (iii) Global biological systems, (iv) Geophysical systems, and (v) Extreme events • Assessment of adaptation costs and benefits • Assessment of adaptation capacity, options and constraints • Scenario-based approach • Economic modelling, anthropological and sociological methods for identifying learning in individuals and organisations • Risk assessments analysis	• Same tools used for defining impacts • Migration and conflict distribution and magnitude data.	• Gender building capacity, • Perform awareness programs and training in adaptation assessment of climate change on health sector, • Bottom-up participation of gender to policies through local communities, • Gender empowerment in health risk assessments, • Gender participation through workshops. • Women access to perform research on CC effect of human health and access funds through small and large	Only when it requires

Overall Rank and Score of Prioritized Climate Change Research Topics		CLIMATE CHANGE Topic Prioritized (Policy-oriented *Research* Needed to Address National Gaps)	Article in Conventions/National Policy	Mandate	Provisions / Main Themes	Specific obligation to Jordan in Conventions	National Legislation Gap (as of before developing the cc Policy)	Specific Research Sub-Guidelines	Specific Research Sub-Procedures	Research Tools	Gender Mainstreaming	Synergies
Overall Rank	Score											
					environment, of projects or measures undertaken by them to mitigate or adapt to climate change			for details on national needs in this regard.			projects.	
15	74.4	Improve institutional capacity building.	**UNFCCC articles 4, 6 COP4, COP5, COP6, COP7**	**Research, Systematic Observation, Education, Training and Public Awareness.**	Same as enhance public awareness and training in climate change related issues.	Direct Obligation	Climate change have been incorporated in many educational stages and training and awareness programs have been conducted at variable levels, however, corporation of NIS, MoP, MoHE and MoEnv is required.	• COP5 "List Of Capacity-Building Needs Of Developing Country Parties" FCCC/CP/2001/L.2 • FCCC/CP/1998/16/Add.1 • FCCC/CP/2001/13/Add.1 • Review the newly developed Climate Change Policy of Jordan for details on national needs in this regard.	• Monitoring of institutional capacity development through • Improve training of scientific, technical and managerial personnel • Promote and facilitate capacities in public access to information on climate change and its effects	• CDM projects • Updating NCSA and NEEDS • Monitoring programs • Update legislations and NAPs	• Same as enhance public awareness and training in climate change related issues	No

Overall Rank and Score of Prioritized Climate Change Research Topics		CLIMATE CHANGE Topic Prioritized (Policy-oriented *Research* Needed to Address National Gaps)	Article in Conventions/National Policy	Mandate	Provisions / Main Themes	Specific obligation to Jordan in Conventions	National Legislation Gap (as of before developing the cc Policy)	Specific Research Sub-Guidelines	Specific Research Sub-Procedures	Research Tools	Gender Mainstreaming	Synergies
Overall Rank	Score											
16	73.9	Vulnerability assessment of climate change on socio-economic sector (vulnerable groups with emphasis on the youth): enhancing environmental knowledge between youth and its accessibility according to the educational needs and interests with special focus on early stages of education; increasing the impact of youth in developing and implementing national environmental policies	**UNFCCC article 4f COP8 COP13 COP16** **National Climate Change Policy for the Hashemite Kingdom of Jordan**	**Commitments / Socio-economic Impact Assessment**	Take climate change considerations into account, to the extent feasible, in their relevant social, economic and environmental policies and actions, and employ appropriate methods, for example impact assessments, formulated and determined nationally, with a view to minimizing adverse effects on the economy, on public health and on the quality of the environment, of projects or	Obligated only upon existence of fund	Impact assessment is missing and needs special inclusions at MoSD and MoH.	• General Guidelines On The Use Of Scenario Data For Climate Impact And Adaptation Assessment, Task Group on Data and Scenario Support for Impact and Climate Assessment (TGICA), IPCC, 2007. • UNFCCC Guidelines: Methods of Assessing Human Health Vulnerability and Public Health Adaptation to Climate Change. • Review the newly developed Climate Change Policy of Jordan for details on national needs	• Vulnerability analysis using (i) Global social systems, (ii) Regional systems, (iii) Global biological systems, (iv) Geophysical systems, and (v) Extreme events • Assessment of adaptation costs and benefits • Assessment of adaptation capacity, options and constraints • Scenario-based approach • Modifying governmental policies, including taxes and regulations, encourage certain economic and social activities and discourage others.	• Same tools used for defining impacts • Gross National Income (GNI) per capita	• Gender building capacity, • Perform awareness programs and training in climate change impacts, adaptation and mitigation, • Bottom-up participation of gender to policies through local communities, • Use of gender-sensitive criteria and indicators to improve their knowledge, • Perform gender-sensitive statistics in relevance and efficiency for addressing gender environment issues, • Govern the basis of full and equitable participation,	Only when it requires

Overall Rank and Score of Prioritized Climate Change Research Topics		CLIMATE CHANGE Topic Prioritized (Policy-oriented *Research* Needed to Address National Gaps)	Article in Conventions/National Policy	Mandate	Provisions / Main Themes	Specific obligation to Jordan in Conventions	National Legislation Gap (as of before developing the cc Policy)	Specific Research Sub-Guidelines	Specific Research Sub-Procedures	Research Tools	Gender Mainstreaming	Synergies
Overall Rank	Score											
		and programs; and maximizing the role of youth in sustainable use of environmental resources for socio-economic development.			measures undertaken by them to mitigate or adapt to climate change			in this regard.			accountability, transparency and equality for sustainable development • Gender participation through workshops. • Women access to perform research and access funds through small and large projects.	
17	73.8	Assessing potential measures to improve energy utilization efficiency (energy demand side).	**UNFCCC article 4b COP13 COP15 COP16**	**Commitments / GHG Mitigation**	Formulate, implement, publish and regularly update national and, where appropriate, regional programmes containing measures to mitigate climate change by addressing anthropogenic emissions	Not an obligation (optional)	Well established strategies exist at MEMR and laws at MoEnv, however MoA, MoT, and MIT strategies requires further inclusions.	• COP15 "Nationally appropriate mitigation actions of developing country Parties" FCCC/CP/2009/11/Add.1. • Review the newly developed Climate Change Policy of Jordan for details on national needs in this regard.	• Fiscal and tax policies can encourage the early introduction of new technologies. The conversion efficiency of electric power plants can be raised. Power-plant emissions can also be reduced by switching to renewable sources. • The residential	• GHG inventory results • Impact and vulnerability results,	• Gender building capacity, • Perform awareness programs and training in GHG-mitigation in energy utilization efficiency, • Gender empowerment in mitigation options, Costs and benefits analysis, uncertainties, barriers and	No

Overall Rank and Score of Prioritized Climate Change Research Topics		CLIMATE CHANGE Topic Prioritized (Policy-oriented *Research* Needed to Address National Gaps)	Article in Conventions/National Policy	Mandate	Provisions / Main Themes	Specific obligation to Jordan in Conventions	National Legislation Gap (as of before developing the cc Policy)	Specific Research Sub-Guidelines	Specific Research Sub-Procedures	Research Tools	Gender Mainstreaming	Synergies
Overall Rank	Score											
					by sources and removals by sinks of all GHGs not controlled by the Montreal Protocol Integrity using markets to enhance the cost-effectiveness of, and to promote, mitigation actions through stimulating mitigation across broad segments of the economy, safeguarding environmental, and ensuring good governance and robust market functioning and				and commercial sectors can adopt more energy-efficient technologies. • Shifting from oil to natural gas in electricity generation sector, employing efficient technologies that consume less fuel; such as combined cycle, and demand side management. • Statistical and cost effective analyses, • Costs and benefits analysis • Uncertainties, barriers and constrain analysis. • Results of impacts and vulnerability analyses • Discount rates • Market efficiency • Transaction and implementation costs		constrain analysis. • Gender access to mitigation through workshops. • Women access to perform mitigation research and application for funds through small and large projects.	

Overall Rank and Score of Prioritized Climate Change Research Topics		CLIMATE CHANGE Topic Prioritized (Policy-oriented *Research* Needed to Address National Gaps)	Article in Conventions/National Policy	Mandate	Provisions / Main Themes	Specific obligation to Jordan in Conventions	National Legislation Gap (as of before developing the cc Policy)	Specific Research Sub-Guidelines	Specific Research Sub-Procedures	Research Tools	Gender Mainstreaming	Synergies
Overall Rank	Score											
					regulation							
18	73.4	Socio-economic cost-benefit analysis of the Climate Change Policy.	**UNFCCC article 4f COP8 COP13 COP16**	**Commitments / Socio-economic Impact Assessment**	Take climate change considerations into account, to the extent feasible, in their relevant social, economic and environmental policies and actions, and employ appropriate methods, for example impact assessments, formulated and determined nationally, with a view to minimizing adverse effects on the economy, on public health and on the quality of the environment,	Obligated only upon existence of fund	Impact assessment is missing and needs special inclusions at MoSD and MoH.	• General Guidelines On The Use Of Scenario Data For Climate Impact And Adaptation Assessment, Task Group on Data and Scenario Support for Impact and Climate Assessment (TGICA), IPCC, 2007. • UNFCCC Guidelines: Methods of Assessing Human Health Vulnerability and Public Health Adaptation to Climate Change. • Review the newly developed Climate Change Policy of Jordan for details on	• Vulnerability analysis using (i) Global social systems, (ii) Regional systems, (iii) Global biological systems, (iv) Geophysical systems, and (v) Extreme events • Assessment of adaptation costs and benefits • Assessment of adaptation capacity, options and constraints • Scenario-based approach • Modifying governmental policies, including taxes and regulations, encourage certain economic and social activities and discourage others.	• Same tools used for defining impacts • Gross National Income (GNI) per capita	• Gender building capacity, • Perform awareness programs and training in climate change impacts, adaptation and mitigation, • Bottom-up participation of gender to policies through local communities, • Use of gender-sensitive criteria and indicators to improve their knowledge, • Perform gender-sensitive statistics in relevance and efficiency for addressing gender environment issues, • Govern the basis of full and equitable	Only when it requires

Overall Rank and Score of Prioritized Climate Change Research Topics		CLIMATE CHANGE Topic Prioritized (Policy-oriented *Research* Needed to Address National Gaps)	Article in Conventions/National Policy	Mandate	Provisions / Main Themes	Specific obligation to Jordan in Conventions	National Legislation Gap (as of before developing the cc Policy)	Specific Research Sub-Guidelines	Specific Research Sub-Procedures	Research Tools	Gender Mainstreaming	Synergies
Overall Rank	Score											
					of projects or measures undertaken by them to mitigate or adapt to climate change			national needs in this regard.			participation, accountability, transparency and equality for sustainable development • Gender participation through workshops. • Women access to perform research and access funds through small and large projects.	
19	73.4	Observation, monitoring and estimation of CC impacts on health sector (solutions to limited data availability, lack of models and tools specifically designed for	**UNFCCC article 4f COP8 COP13 COP16**	**Commitments / Socio-economic Impact Assessment**	Take climate change considerations into account, to the extent feasible, in their relevant social, economic and environmental policies and actions, and employ appropriate methods, for	Obligated only upon existence of fund	Impact assessment is missing and needs special inclusions at MoSD and MoH.	Series CC impacts on public health are expected either by increasing the occurrence of diseases transported by wind or water or by direct physiological effects of exposing to sun radiation and temperature increase.	• Field survey for human health provides better estimation for the direct impact and thus provides adaptation needs. • Bank recording for disease incidence at spatial scale reduce the uncertainties in the estimation. • Modeling using specific scenarios for borne diseases at local scale	• Direct physiological and indirect ecological surveillance records and logbooks • Diseases incident data • Temperature-related mortality in summers • Vector-borne diseases as Tick-borne	• Gender building capacity, • Perform awareness programs and training in observation, monitoring and estimation of CC impacts on health sector, • Bottom-up participation of gender to policies through local communities,	No

Overall Rank and Score of Prioritized Climate Change Research Topics		CLIMATE CHANGE Topic Prioritized (Policy-oriented *Research* Needed to Address National Gaps)	Article in Conventions/National Policy	Mandate	Provisions / Main Themes	Specific obligation to Jordan in Conventions	National Legislation Gap (as of before developing the cc Policy)	Specific Research Sub-Guidelines	Specific Research Sub-Procedures	Research Tools	Gender Mainstreaming	Synergies
Overall Rank	Score											
		local conditions).			example impact assessments, formulated and determined nationally, with a view to minimizing adverse effects on the economy, on public health and on the quality of the environment, of projects or measures undertaken by them to mitigate or adapt to climate change			The observed changes are primarily related to temperature trends and changes in temperature extremes and relate to a range of infectious and non-infectious disease outcomes. • Review the newly developed Climate Change Policy of Jordan for details on national needs in this regard.	defines the trend of spreading. Spatial and temporal tend analysis of human health • Detailed region-specific scenarios • Ecological analysis	encephalitis (TBE) • Food- and water-borne diseases as Salmonellosis • Pollen- and dust-related diseases as abundance and allergenicity	• Gender empowerment in health risk assessments, • Gender participation through workshops. • Women access to perform research on CC effect of human health and access funds through small and large projects.	
20	72.5	Ensure that the interest of vulnerable groups (i.e poor, gender, and youth) are adequately addressed in national	**UNFCCC articles 3, 4 COP4, COP5, COP6, COP7**	**Climate Change Legal and Institutional Framework**	Same as integrate climate change in current legislative and policy framework.	Obligated only upon existence of fund		• Same as integrate climate change in current legislative and policy framework. • Review the newly	Same as integrate climate change in current legislative and policy framework.	Same as integrate climate change in current legislative and policy framework.	• Same as integrate climate change in current legislative and policy framework.	Only when it requires

Overall Rank and Score of Prioritized Climate Change Research Topics		CLIMATE CHANGE Topic Prioritized (Policy-oriented *Research* Needed to Address National Gaps)	Article in Conventions/National Policy	Mandate	Provisions / Main Themes	Specific obligation to Jordan in Conventions	National Legislation Gap (as of before developing the cc Policy)	Specific Research Sub-Guidelines	Specific Research Sub-Procedures	Research Tools	Gender Mainstreaming	Synergies
Overall Rank	Score											
		mitigation and adaptation policies.	**National Climate Change Policy for the Hashemite Kingdom of Jordan**					developed Climate Change Policy of Jordan for details on national needs in this regard.				
21	72.2	Climate change projection and downscaling analysis.	**UNFCCC article 5a COP3 COP4 COP15**	**Research, Systematic Observation, Education, Training and Public Awareness.**	• Promote and cooperate in scientific, technological, technical, socio-economic and other research, systematic observation and development of data archives related to the climate system and	Obligated only upon existence of fund	Only available at MoEnv and JMD, however, there is no policy or strategy covers this part and needs corporation of the two parties in addition other related ministries at the impact	• Global climate change is rough and has no physical consistency over a region, thus, for regional analysis, projections and downscaling are required. • Model resolution has to be high enough to capture the basic mesoscale forcing of relevance and its domain large enough to allow the full	• Regional Circulation models ability to simulate smaller-scale atmospheric features, e.g., orographic precipitation and they respond in a physically consistent way to different external forcing, e.g., atmospheric chemistry changes • Climate scenarios analyses including low-resolution of General Circulation Model (GCM), high-resolution models as regional climate	• Weather data, • Digital Elevation Models (DEM) • Statistical downscaling as Statistical Downscaling Model (SDSM), Scenarios of extreme weather events as Integrated Assessment Models (IAMs).	•	

Overall Rank and Score of Prioritized Climate Change Research Topics		CLIMATE CHANGE Topic Prioritized (Policy-oriented *Research* Needed to Address National Gaps)	Article in Conventions/National Policy	Mandate	Provisions / Main Themes	Specific obligation to Jordan in Conventions	National Legislation Gap (as of before developing the cc Policy)	Specific Research Sub-Guidelines	Specific Research Sub-Procedures	Research Tools	Gender Mainstreaming	Synergies
Overall Rank	Score											
					intended to further the understanding and to reduce or eliminate the remaining uncertainties regarding the causes, effects, magnitude and timing of climate change and the economic and social consequences of various response strategies. • Support the regional and global observational systems		part. Environmental Information Networking needs activation at MoEnv.	development of mesoscale circulations. • Review the newly developed Climate Change Policy of Jordan for details on national needs in this regard.	models (RCM), AOGCMs, and emissions scenarios, • Scenarios of atmospheric composition • Sea-level scenarios • Socio-economic scenarios			

Overall Rank and Score of Prioritized Climate Change Research Topics		CLIMATE CHANGE Topic Prioritized (Policy-oriented *Research* Needed to Address National Gaps)	Article in Conventions/National Policy	Mandate	Provisions / Main Themes	Specific obligation to Jordan in Conventions	National Legislation Gap (as of before developing the cc Policy)	Specific Research Sub-Guidelines	Specific Research Sub-Procedures	Research Tools	Gender Mainstreaming	Synergies
Overall Rank	Score											
					developed under the Global Climate Observing System, the Global Ocean Observing System and the Global Terrestrial Observing System, through appropriate funding mechanisms and support national terrestrial networks including observational programmes to collect, exchange and preserve terrestrial data.							

Overall Rank and Score of Prioritized Climate Change Research Topics		CLIMATE CHANGE Topic Prioritized (Policy-oriented *Research* Needed to Address National Gaps)	Article in Conventions/National Policy	Mandate	Provisions / Main Themes	Specific obligation to Jordan in Conventions	National Legislation Gap (as of before developing the cc Policy)	Specific Research Sub-Guidelines	Specific Research Sub-Procedures	Research Tools	Gender Mainstreaming	Synergies
Overall Rank	Score											
22	71.8	Assessing GHG mitigation options.	**UNFCCC article 4b COP13 COP15 COP16**	**Commitments / GHG Mitigation**	Formulate, implement, publish and regularly update national and, where appropriate, regional programmes containing measures to mitigate climate change by addressing anthropogenic emissions by sources and removals by sinks of all GHGs not controlled by the Montreal Protocol Integrity using markets to enhance the cost-effectiveness of, and to promote, mitigation	Not an obligation (optional)	Well established strategies exist at MEMR and laws at MoEnv, however MoA, MoT, and MIT strategies requires further inclusions.	• COP15 "Nationally appropriate mitigation actions of developing country Parties" FCCC/CP/2009/11/Add.1 • General Guidelines On The Use Of Scenario Data For Climate Impact And Adaptation Assessment, Task Group on Data and Scenario Support for Impact and Climate Assessment (TGICA), IPCC, 2007. • Review the newly developed Climate Change Policy of Jordan for details on national needs in this regard.	• GHGs emissions might be reduced by introducing of nuclear power plants, oil shale based power plants, providing sources of renewable energy and providing energy conservation techniques, enhance waste collection and management, conservation of land, water and natural vegetation, conservation (biodiversity), monitoring environmental changes, combating desertification, and restoring degraded ecosystem of rangelands and forests. • Means to enhance innovation in GHG abatement technologies and	• Detailed research in sustainable management in accordance to biodiversity and desertification • Legal and institutional framework Outputs of GHG inventory • Outputs of CC impacts • Direct and indirect economic impacts • New technologies for GHG stabilizations at local scale • National development goals • Implementation policies • Sustainability	• Perform awareness programs and training in energy conservation techniques, enhance waste collection and management, conservation of land, water and natural vegetation, conservation • Gender empowerment in GHG abatement technologies, and Costs and benefits analysis • Gender access mitigation through workshops. • Women access to perform mitigation research and application for funds through small and large projects.	Synergy with biodiversity through vegetation, in-situ and ex-situ conservation, rehabilitation, sustainable use of components of biological diversity, and biotechnology Synergy with desertification through carbon sequestration, land management, and use of alternative and renewable energy sources

Overall Rank and Score of Prioritized Climate Change Research Topics		CLIMATE CHANGE Topic Prioritized (Policy-oriented *Research* Needed to Address National Gaps)	Article in Conventions/National Policy	Mandate	Provisions / Main Themes	Specific obligation to Jordan in Conventions	National Legislation Gap (as of before developing the cc Policy)	Specific Research Sub-Guidelines	Specific Research Sub-Procedures	Research Tools	Gender Mainstreaming	Synergies
Overall Rank	Score											
					actions through stimulating mitigation across broad segments of the economy, safeguarding environmental, and ensuring good governance and robust market functioning and regulation				determinants of the rate of technological change; • Geographic distribution of renewable sources and analysis of their cost-effectiveness; • Small scale data modelling • Provide conservation and/or enhancement alternatives for GHGs • Baseline scenarios by sector and gas • Mitigation scenario options by sector and gas, options, their costs and the barriers to their implementation • Statistical and cost effective analyses, • Analysis of the ancillary benefits, the costs of damages, impacts of response	options • Field evaluations and uncertainty • Market efficiency • Transaction and implementation costs		

Overall Rank and Score of Prioritized Climate Change Research Topics		CLIMATE CHANGE Topic Prioritized (Policy-oriented *Research* Needed to Address National Gaps)	Article in Conventions/National Policy	Mandate	Provisions / Main Themes	Specific obligation to Jordan in Conventions	National Legislation Gap (as of before developing the cc Policy)	Specific Research Sub-Guidelines	Specific Research Sub-Procedures	Research Tools	Gender Mainstreaming	Synergies
Overall Rank	Score											
									measures, and constraints and opportunities for the adoption of low GHG emitting technologies; • Implementation of sustainable management plans in all sectors including biomass, forests and oceans as well as other terrestrial, coastal and marine ecosystems. • Costs and benefits analysis • Uncertainties, barriers and constrain analysis.			
23	71.7	Socio-economic impacts analysis at global and regional scales.	**UNFCCC article 4f COP8 COP13 COP16**	**Commitments / Socio-economic Impact Assessment**	Take climate change considerations into account, to the extent feasible, in their relevant social, economic and environmental policies	Obligated only upon existence of fund	Impact assessment is missing and needs special inclusions at MoSD and MoH.	• Poor people are more susceptible to CC impacts (equity issue), therefore, poverty, hunger, risks, migration corridors, social tensions, fragmentations and others may	• Detailed social surveying to individual level at spatial scale. • Baseline Socioeconomic Scenarios • Detailed statistical analysis • Downscaling Scenarios based on population and gross domestic	• Field survey for poverty, resilience, awareness, etc • Agricultural impacts • Water impacts • Health impacts • Financial data	• Gender building capacity, • Perform awareness programs and training in CC impacts, adaptation and mitigation, • Bottom-up participation of gender to policies through	Only when it requires

Overall Rank and Score of Prioritized Climate Change Research Topics		CLIMATE CHANGE Topic Prioritized (Policy-oriented *Research* Needed to Address National Gaps)	Article in Conventions/National Policy	Mandate	Provisions / Main Themes	Specific obligation to Jordan in Conventions	National Legislation Gap (as of before developing the cc Policy)	Specific Research Sub-Guidelines	Specific Research Sub-Procedures	Research Tools	Gender Mainstreaming	Synergies
Overall Rank	Score											
					and actions, and employ appropriate methods, for example impact assessments, formulated and determined nationally, with a view to minimizing adverse effects on the economy, on public health and on the quality of the environment, of projects or measures undertaken by them to mitigate or adapt to climate change			consider indicators. • Economically, weak tacit and explicit knowledge on CC impacts, missing motives and willingness among civilians, and financial drops can be used as indicators. • Detailed study for social behaviour changes with climate change challenges allows better understanding of human ethics. • UNFCCC Guidelines: Methods of Assessing Human Health Vulnerability and Public Health Adaptation to Climate Change	product (GDP) • Participatory rural appraisals and participatory mapping • Sustainable development indicators	• Energy demand, Building energy consumption • Tourism fluctuations	local communities, • Use of gender-sensitive criteria and indicators to improve their knowledge, • Perform gender-sensitive statistics in relevance and efficiency for addressing gender environment issues, • Gender participation through workshops. • Women access to perform research on CC effect of human health and access funds through small and large projects.	

Overall Rank and Score of Prioritized Climate Change Research Topics		CLIMATE CHANGE Topic Prioritized (Policy-oriented *Research* Needed to Address National Gaps)	Article in Conventions/National Policy	Mandate	Provisions / Main Themes	Specific obligation to Jordan in Conventions	National Legislation Gap (as of before developing the cc Policy)	Specific Research Sub-Guidelines	Specific Research Sub-Procedures	Research Tools	Gender Mainstreaming	Synergies
Overall Rank	Score											
24	71.0	Assessing potential measures to reduce GHG emissions by agriculture sector.	**UNFCCC article 4b COP13 COP15 COP16**	**Commitments / GHG Mitigation**	Formulate, implement, publish and regularly update national and, where appropriate, regional programmes containing measures to mitigate climate change by addressing anthropogenic emissions by sources and removals by sinks of all GHGs not controlled by the Montreal Protocol Integrity using markets to enhance the cost-effectiveness of, and to promote, mitigation	Not an obligation (optional)	Well established strategies exist at MoEnv, however MoA strategies requires further inclusions.	• COP15 "Nationally appropriate mitigation actions of developing country Parties" FCCC/CP/2009/11/Add.1 • Review the newly developed Climate Change Policy of Jordan for details on national needs in this regard.	• A variety of options exists for mitigation of GHG emissions in agriculture. The most prominent options are improved crop and grazing land management (e.g., improved agronomic practices, nutrient use, tillage, and residue management), restoration of organic soils that are drained for crop production and restoration of degraded lands. Lower but still significant mitigation is possible with improved water and rice management; set-asides, land use change (e.g., conversion of cropland to grassland) and agro-forestry; as	• Data on Agronomy, Nutrient management, Tillage/residue management, Water management (irrigation, drainage), Agro-forestry, Set-aside, land-use change, Grazing intensity, Increased productivity, Species introduction, Erosion control, organic amendments, nutrient Amendments, Improved feeding practices, Specific agents and dietary additives,	• Gender building capacity, • Perform awareness programs and training in GHG-mitigation in agriculture sector, • Gender empowerment in mitigation options, Costs and benefits analysis, uncertainties, barriers and constrain analysis. • Gender employment through local communities in crop and grazing land management, agronomic practices, nutrient use, tillage, and residue, etc. • Gender access to mitigation through	Synergies with desertification restoration at degraded lands Synergy with biodiversity at agro-forestry, restoration and rehabilitation

Overall Rank and Score of Prioritized Climate Change Research Topics		CLIMATE CHANGE Topic Prioritized (Policy-oriented *Research* Needed to Address National Gaps)	Article in Conventions/National Policy	Mandate	Provisions / Main Themes	Specific obligation to Jordan in Conventions	National Legislation Gap (as of before developing the cc Policy)	Specific Research Sub-Guidelines	Specific Research Sub-Procedures	Research Tools	Gender Mainstreaming	Synergies
Overall Rank	Score											
					actions through stimulating mitigation across broad segments of the economy, safeguarding environmental, and ensuring good governance and robust market functioning and regulation				well as improved livestock and manure management. Climate-friendly agricultural technologies and practices, including traditional agricultural methods • Opportunities analysis for mitigating GHGs in agriculture through: (i) Reducing emissions, (ii) Reducing emissions, and (iii) Avoiding (or displacing) emissions. • Costs and benefits analysis • Uncertainties, barriers and constrain analysis. • Results of impacts and vulnerability analyses • Global development	etc. • Market price data	workshops. • Women access to perform mitigation research and application for funds through small and large projects.	

Overall Rank and Score of Prioritized Climate Change Research Topics		CLIMATE CHANGE Topic Prioritized (Policy-oriented *Research* Needed to Address National Gaps)	Article in Conventions/National Policy	Mandate	Provisions / Main Themes	Specific obligation to Jordan in Conventions	National Legislation Gap (as of before developing the cc Policy)	Specific Research Sub-Guidelines	Specific Research Sub-Procedures	Research Tools	Gender Mainstreaming	Synergies
Overall Rank	Score											
									trends in the agriculture sector (production and consumption) • Global and regional emission trends of all GHGs			
25	70.2	Assessing potential measures to reduce GHG emissions by energy sector (including energy industries subsector and transport subsector).	**UNFCCC article 4b COP13 COP15 COP16**	**Commitments / GHG Mitigation**	Formulate, implement, publish and regularly update national and, where appropriate, regional programmes containing measures to mitigate climate change by addressing anthropogenic emissions by sources and removals by sinks of all GHGs not controlled by the Montreal Protocol Integrity using	Not an obligation (optional)	Well established strategies exist at MEMR and laws at MoEnv, however strategies requires further inclusions.	• COP15 "Nationally appropriate mitigation actions of developing country Parties" FCCC/CP/2009/11/Add.1. • Review the newly developed Climate Change Policy of Jordan for details on national needs in this regard.	• A variety of projections of the energy picture have been made for the coming decades. These differ in terms of their modelling structure and input assumptions and, in particular, on the evolution of policy in the coming decades. • There are various types of technologies that can play significant roles in mitigating climate change, including energy efficiency improvements throughout the energy system (especially at the end use side);	• Outputs of GHG inventory • Outputs of CC impacts • Direct and indirect economic impacts • National development goals • Implementation policies • Discount rates • Market efficiency • Transaction and implementation costs • Decision support tools • Integrated Assessment Models	• Gender building capacity, • Perform awareness programs and training in energy efficiency improvements, • Gender empowerment in mitigation options, risks and uncertainty analysis, sequential decision-making, and policy optimization • Gender access through workshops. • Women access to perform mitigation research and application for funds through	No

Overall Rank and Score of Prioritized Climate Change Research Topics		CLIMATE CHANGE Topic Prioritized (Policy-oriented *Research* Needed to Address National Gaps)	Article in Conventions/National Policy	Mandate	Provisions / Main Themes	Specific obligation to Jordan in Conventions	National Legislation Gap (as of before developing the cc Policy)	Specific Research Sub-Guidelines	Specific Research Sub-Procedures	Research Tools	Gender Mainstreaming	Synergies
Overall Rank	Score											
					markets to enhance the cost-effectiveness of, and to promote, mitigation actions through stimulating mitigation across broad segments of the economy, safeguarding environmental, and ensuring good governance and robust market functioning and regulation				solar, wind, nuclear fission and fusion and geothermal, biomass and clean fossil technologies, including carbon capture and storage; energy from waste; hydrogen production from non-fossil energy sources and fuel cells. • Approaches are: (1) Risks and uncertainty analysis, (2) Sequential decision-making, (3) Policy optimization models as: (i) Cost-benefit approaches, (ii) Target-based approaches, and (iii) Decision strategies approaches. • Policy evaluation approaches include: (i) Deterministic	(IAMs)	small and large projects.	

Overall Rank and Score of Prioritized Climate Change Research Topics		CLIMATE CHANGE Topic Prioritized (Policy-oriented *Research* Needed to Address National Gaps)	Article in Conventions/National Policy	Mandate	Provisions / Main Themes	Specific obligation to Jordan in Conventions	National Legislation Gap (as of before developing the cc Policy)	Specific Research Sub-Guidelines	Specific Research Sub-Procedures	Research Tools	Gender Mainstreaming	Synergies
Overall Rank	Score											
									projection approaches, (ii) Stochastic projection approach, (iii) Exploratory modelling, and (iv) Public participation processes. • Costs and benefits analysis • Uncertainties, barriers and constrain analysis. • Global development trends in the energy sector (production and consumption) • Global and regional emission trends of all GHGs • Energy efficiency, energy savings, renewable energy and less-greenhouse-gas-emitting advanced fossil-fuel technologies; GHG emission projections, or			

Overall Rank and Score of Prioritized Climate Change Research Topics		CLIMATE CHANGE Topic Prioritized (Policy-oriented *Research* Needed to Address National Gaps)	Article in Conventions/National Policy	Mandate	Provisions / Main Themes	Specific obligation to Jordan in Conventions	National Legislation Gap (as of before developing the cc Policy)	Specific Research Sub-Guidelines	Specific Research Sub-Procedures	Research Tools	Gender Mainstreaming	Synergies
Overall Rank	Score											
									forecasts, for communities should reflect a business-as-usual (BAU) approach, in which emissions are projected in the absence of any policies or actions that would occur beyond the base year that would reduce emissions. • Estimating population and VMT growth, Future electricity coefficients, Accounting for state-level actions, Renewable Portfolio Standard			
26	70.0	Integrate climate change in Green Growth and Sustainable Development Plans.	**UNFCCC articles 3, 4 COP4, COP5, COP6, COP7** **National Climate Change**	**Climate Change Legal and Institutional Framework**	Parties have a right to, and should, promote sustainable development. Parties should cooperate to promote a supportive and open international	Obligated only upon existence of fund		• Same as integrate climate change in current legislative and policy framework. • Review the newly developed Climate Change Policy of Jordan	• Same as integrate climate change in current legislative and policy framework.	• Same as integrate climate change in current legislative and policy framework.	• Same as integrate climate change in current legislative and policy framework.	Only when it requires

Overall Rank and Score of Prioritized Climate Change Research Topics		CLIMATE CHANGE Topic Prioritized (Policy-oriented *Research* Needed to Address National Gaps)	Article in Conventions/National Policy	Mandate	Provisions / Main Themes	Specific obligation to Jordan in Conventions	National Legislation Gap (as of before developing the cc Policy)	Specific Research Sub-Guidelines	Specific Research Sub-Procedures	Research Tools	Gender Mainstreaming	Synergies
Overall Rank	Score											
			Policy for the Hashemite Kingdom of Jordan		economic system that would lead to sustainable economic growth and development			for details on national needs in this regard.				
27	69.9	Quantification of GHGs emissions by agricultural sector including forestry and land use which implies enteric fermentation, manure management, LULC change, biomass burning, liming, urea application, direct and indirect N2O emissions from	**UNFCCC article 4a COP2, COP8, COP9, COP15**	**Commitments / GHG Inventory**	Develop, periodically update, publish and make available to the COP national inventories of anthropogenic emissions by sources and removals by sinks of all GHG not controlled by the Montreal Protocol	Obligated only upon existence of fund	There is no specific policy or strategy concerning this part, thus updates of MoEnv in corporations with MEMR, MoA, MoT, and MIT are required	• Guidelines for the preparation of national communications FCCC/SBI/2002/15, FCCC/SBSTA/2004/8 and FCCC/SBSTA/2006/9 • Guidelines are set by the UNFCCC in their COP2, 8, 9 and COP15 "Quantified economy-wide emissions targets for 2020" FCCC/CP/2009/11/Add.1 FCCC/CP/1996/15/Add.1 • 2006 IPCC	• GHGs emission can be estimated directly at farm level for each land-use category or indirectly using available data and modelling analyses according to LULC. • Trend analysis for carbon stocks. • LULC and LULUCF maps derived from arial photos and satellite images. • GIS model based systems. • Change in biomass carbon stocks according to LULC and LULUCF. • Advance CC modelling to local point is preferred at farm level to reduce	• Farm statistics and land categories available at MoA, NCARE, and DOS. • UNFCCC CRF Reporter, UNFCCC-NAI Software • Statistical prediction tools	• Gender building capacity, • Gender training, in quantification process including GIS, biomass change, etc • Gender employment in agricultural sector , • Using a "bottom-up" model to assess marginalized people's knowledge, • Implementation of local women communities' workshops.	Synergy with desertification in estimation LULC changes, biomass burn, carbon stock, GHGs emissions and soil loss.

Overall Rank and Score of Prioritized Climate Change Research Topics		CLIMATE CHANGE Topic Prioritized (Policy-oriented *Research* Needed to Address National Gaps)	Article in Conventions/National Policy	Mandate	Provisions / Main Themes	Specific obligation to Jordan in Conventions	National Legislation Gap (as of before developing the cc Policy)	Specific Research Sub-Guidelines	Specific Research Sub-Procedures	Research Tools	Gender Mainstreaming	Synergies
Overall Rank	Score											
		managed soils, and miscellaneous.						Guidelines for National Greenhouse Gas Inventories, Volume 4, Agriculture, Forestry and Other Land Use • UNFCCC Reporting on Climate Change user manual for the guidelines on national communications from non-Annex I Parties, 2003. • Review the newly developed Climate Change Policy of Jordan for details on national needs in this regard.	uncertainties • Prediction analyses of adverse impacts should be based on global scale and small scale • Developing long-term climate changes (beyond 2100) and probabilities for abrupt changes in the climate system are required			
28	69.2	Assessing potential measures to reduce GHG emissions from waste (including	**UNFCCC article 4b COP13 COP15 COP16**	**Commitments / GHG Mitigation**	Formulate, implement, publish and regularly update national and, where appropriate,	Not an obligation (optional)	Well established strategies exist at MEMR and laws at MoEnv,	• COP15 "Nationally appropriate mitigation actions of developing country Parties" FCCC/CP/2009/	• There are various types of technologies that can play significant roles in mitigating climate change through the knowledge of	• Outputs of GHG inventory • Outputs of CC impacts • CO_2 from waste incineration	• Gender building capacity, • Perform awareness programs and training in waste management and GHG-	No

Overall Rank and Score of Prioritized Climate Change Research Topics		CLIMATE CHANGE Topic Prioritized (Policy-oriented *Research* Needed to Address National Gaps)	Article in Conventions/National Policy	Mandate	Provisions / Main Themes	Specific obligation to Jordan in Conventions	National Legislation Gap (as of before developing the cc Policy)	Specific Research Sub-Guidelines	Specific Research Sub-Procedures	Research Tools	Gender Mainstreaming	Synergies
Overall Rank	Score											
		wastewater) sector.			regional programmes containing measures to mitigate climate change by addressing anthropogenic emissions by sources and removals by sinks of all GHGs not controlled by the Montreal Protocol Integrity using markets to enhance the cost-effectiveness of, and to promote, mitigation actions through stimulating mitigation across broad segments of the economy,		however MoA, MoT, and MIT strategies requires further inclusions.	11/Add.1. • Review the newly developed Climate Change Policy of Jordan for details on national needs in this regard.	waste generation, development trends for waste, and regional emission trends. • GHG emissions from waste sector can be reduced through waste management and GHG-mitigation technologies, CH_4 management at landfills, incineration and other thermal processes for waste-to-energy, Waste reduction, re-use and recycling, Fluorinated gases: end-of-life issues, data and trends in the waste sector • Costs and benefits analysis • Uncertainties, barriers and constrain analysis. • Results of impacts and vulnerability analyses • Global	• Direct and indirect economic impacts • National development goals • Implementation policies • Discount rates • Market efficiency • Transaction and implementation costs	mitigation technologies, • Gender empowerment in mitigation options, Costs and benefits analysis, uncertainties, barriers and constrain analysis. • Gender employment through local communities in waste reduction, re-use and recycling, • Gender access to mitigation through workshops. • Women access to perform mitigation research and application for funds through small and large projects.	

Overall Rank and Score of Prioritized Climate Change Research Topics		CLIMATE CHANGE Topic Prioritized (Policy-oriented *Research* Needed to Address National Gaps)	Article in Conventions/National Policy	Mandate	Provisions / Main Themes	Specific obligation to Jordan in Conventions	National Legislation Gap (as of before developing the cc Policy)	Specific Research Sub-Guidelines	Specific Research Sub-Procedures	Research Tools	Gender Mainstreaming	Synergies
Overall Rank	Score											
					safeguarding environmental, and ensuring good governance and robust market functioning and regulation				development trends in the waste sector (production and consumption) • Global and regional emission trends of all GHGs • Waste management and mitigation costs and potentials • Landfill CH_4: regional trends			
29	69.1	Quantification of GHGs emissions by energy sector including fossil fuel combustion, electricity, natural gas, etc.	**UNFCCC article 4a COP2, COP8, COP9, COP15**	**Commitments / GHG Inventory**	Develop, periodically update, publish and make available to the COP national inventories of anthropogenic emissions by sources and removals by sinks of all GHG not controlled by the Montreal Protocol	Obligated only upon existence of fund	There is no specific policy or strategy concerning this part, thus updates of MoEnv in corporations with MEMR, MoA, MoT, and MIT are required	• Guidelines are set by the UNFCCC in their COP 2, 8, 9 and COP 15 "Quantified economy-wide emissions targets for 2020" FCCC/CP/2009/11/Add.1 FCCC/CP/1996/15/Add.1 • Guidelines for the preparation of national communications FCCC/SBSTA/20	• GHG emissions can be quantified by either directly measuring or by estimation. • Direct quantification of immersions energy use in the residential and commercial sectors by unit. • There are two approaches for collecting activity data: "top down" and "bottom up." Top-down inventories rely on data collected and	• Direct estimation data on fuel type, and consumption. • Indirect available data of households, purchased electricity, etc. • Gathering data from (1) National Statistics Agencies, (2) Sectoral experts,	• Gender building capacity and training, • Gender employment in energy sector and/or for quantification of immersions energy use in the residential and commercial sectors by unit, • Using a "bottom-up" model to assess marginalized people's knowledge.	No

Overall Rank and Score of Prioritized Climate Change Research Topics		CLIMATE CHANGE Topic Prioritized (Policy-oriented *Research* Needed to Address National Gaps)	Article in Conventions/National Policy	Mandate	Provisions / Main Themes	Specific obligation to Jordan in Conventions	National Legislation Gap (as of before developing the cc Policy)	Specific Research Sub-Guidelines	Specific Research Sub-Procedures	Research Tools	Gender Mainstreaming	Synergies
Overall Rank	Score											
								04/8 and FCCC/SBSTA/2006/9 • 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 1, General Guidance and Reporting • 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2, Energy • UNFCCC Reporting on Climate Change user manual for the guidelines on national communications from non-Annex I Parties, 2003. • Review the newly developed Climate Change Policy of Jordan	aggregated by state, national, and international agencies. • Inventories that use a bottom-up approach generally collect and aggregate data from local end users, such as utilities. • Gap analysis in data set (including filling gaps in periodic data, time series revision, incorporating improved data, compensating for deteriorating data, incomplete coverage). • SO2 and GHGs emission from two main categories, fuel combustion and fugitive emissions based on Reference Approach and by main source categories and by emissions from	stakeholder organizations, (3) Other national experts, (4) IPCC Emission Factor Database, (5) Other international experts, (6) International organizations publishing statistics, (7) Reference libraries, (8) Scientific and technical articles in environmental books, journals and reports, (9) Universities, (10) Web search for organizations & specialists, (11) National Inventory Reports from Parties to the UNFCCC.		

Overall Rank and Score of Prioritized Climate Change Research Topics		CLIMATE CHANGE Topic Prioritized (Policy-oriented *Research* Needed to Address National Gaps)	Article in Conventions/National Policy	Mandate	Provisions / Main Themes	Specific obligation to Jordan in Conventions	National Legislation Gap (as of before developing the cc Policy)	Specific Research Sub-Guidelines	Specific Research Sub-Procedures	Research Tools	Gender Mainstreaming	Synergies
Overall Rank	Score											
								for details on national needs in this regard.	aircraft. • Quality assurance/quality control (QA/QC) analysis.	• Computer based programs as: UNFCCC CRF Reporter, UNFCCC-NAI Software, Clean Air and Climate Protection Software, Climate CHECK, ENERGY STAR Portfolio Manager. • Local Government Greenhouse Gas Protocol. • Office Carbon Footprint Tool. • Regional Greenhouse Gas Protocol. • Calculators as GHG Equivalency Calculator and Personal Emissions		

Overall Rank and Score of Prioritized Climate Change Research Topics		CLIMATE CHANGE Topic Prioritized (Policy-oriented *Research* Needed to Address National Gaps)	Article in Conventions/National Policy	Mandate	Provisions / Main Themes	Specific obligation to Jordan in Conventions	National Legislation Gap (as of before developing the cc Policy)	Specific Research Sub-Guidelines	Specific Research Sub-Procedures	Research Tools	Gender Mainstreaming	Synergies
Overall Rank	Score											
										Calculator, etc.		
30	69.0	Assessing potential measures to reduce GHG emissions from other resources and activities (landuse, landuse change and forestry).	**UNFCCC article 4b COP13 COP15 COP16 COP13 COP15 COP16**	**Commitments / GHG Mitigation**	Formulate, implement, publish and regularly update national and, where appropriate, regional programmes containing measures to mitigate climate change by addressing anthropogenic emissions by sources and removals by sinks of all GHGs not controlled by the Montreal Protocol Integrity using markets to enhance the cost-effectiveness of, and to	Not an obligation (optional)	Well established strategies exist at at MoEnv, however MoA, strategies requires further inclusions.	• COP15 "Nationally appropriate mitigation actions of developing country Parties" FCCC/CP/2009/11/Add.1. • Review the newly developed Climate Change Policy of Jordan for details on national needs in this regard.	• Other resources include transportation, water, agriculture, human activities not included above. • Travel Efficiency Assessment Method (TEAM) is one of the approaches for assessing the potential of on-road travel efficiency strategies for reducing criteria and GHG emissions. • Estimating the potential of biological treatment including composting, anaerobic digestion, and MBT (Mechanical Biological Treatment) of wastewater for	• Results of impacts and vulnerability analyses • GHG inventory results • Transportation Data • Computer software as EX-Ante Carbon-balance Tool (EX-ACT), meta-analysis with Comprehensive Meta-Analysis (CMA) software, Farmscoper , data mining, other statistical tools	• Gender building capacity, • Perform awareness programs and training in GHG-mitigation in transportation, water, agriculture, human activities, • Gender empowerment in mitigation options, Costs and benefits analysis, uncertainties, barriers and constrain analysis. • Gender employment in data collection and computer analysis, • Gender access to mitigation through workshops. • Women access to perform	Synergy with biodiversity at biotechnology

Overall Rank and Score of Prioritized Climate Change Research Topics		CLIMATE CHANGE Topic Prioritized (Policy-oriented *Research* Needed to Address National Gaps)	Article in Conventions/National Policy	Mandate	Provisions / Main Themes	Specific obligation to Jordan in Conventions	National Legislation Gap (as of before developing the cc Policy)	Specific Research Sub-Guidelines	Specific Research Sub-Procedures	Research Tools	Gender Mainstreaming	Synergies
Overall Rank	Score											
					promote, mitigation actions through stimulating mitigation across broad segments of the economy, safeguarding environmental, and ensuring good governance and robust market functioning and regulation				reducing GHG emissions. • Costs and benefits analysis • Uncertainties, barriers and constrain analysis. • Green accounting • Global development trends • Global and regional emission trends of all GHGs • Market efficiency analysis • Transaction and implementation costs analysis		mitigation research and application for funds through small and large projects.	
31	69.0	Integrated analysis of climate change impacts, vulnerabilities, mitigation and adaptation in unit based system.	**UNFCCC articles 4, 5 COP3 COP4 COP15**	**Research, Systematic Observation, Education, Training and Public Awareness.**	• Support and further develop, as appropriate, international and intergovernmental programmes and networks	Obligated only upon existence of fund	Only available at MoEnv and JMD, however, there is no policy or strategy covers this part and needs corporation	• Search for appropriate funding for technology transfer and research to integrate impacts, vulnerabilities, mitigation and adaptation in unit based system.	• Funding windows • Awareness programs • Inclusion and corporation with private sectors • Partnerships with other parties or international sectors • Carbon market and trading	• GHG inventory analysis • Impacts and vulnerability analysis • Mitigation analysis • Adaptive cost benefit analysis • Developing adaptation	• Gender building capacity, • Women training in climate change impacts, vulnerabilities, mitigation and adaptation • Women empowerment in CC unit base system, • Gender	With all

Overall Rank and Score of Prioritized Climate Change Research Topics		CLIMATE CHANGE Topic Prioritized (Policy-oriented *Research* Needed to Address National Gaps)	Article in Conventions/National Policy	Mandate	Provisions / Main Themes	Specific obligation to Jordan in Conventions	National Legislation Gap (as of before developing the cc Policy)	Specific Research Sub-Guidelines	Specific Research Sub-Procedures	Research Tools	Gender Mainstreaming	Synergies
Overall Rank	Score											
					or organizations aimed at defining, conducting, assessing and financing research, data collection and systematic observation, taking into account the need to minimize duplication of effort; • Support international and intergovernmental efforts to strengthen systematic observation and national		of the two parties in addition other related ministries at the impact part. Environmental Information Networking needs activation at MoEnv.	• Searching for mega-projects to be implemented at actual floor.		strategies and their link to sustainable development and equity issues with specific focus on developing countries. • Research on likelihood, magnitude and timescale of large impacts and abrupt or irreversible events	participation through workshops. • Women access to CC research and access funds. • Support thematic expertise on gender issue, availability of gender-disaggregated information, and staff accountability mechanisms for gender mainstreaming	

Overall Rank and Score of Prioritized Climate Change Research Topics		CLIMATE CHANGE Topic Prioritized (Policy-oriented *Research* Needed to Address National Gaps)	Article in Conventions/National Policy	Mandate	Provisions / Main Themes	Specific obligation to Jordan in Conventions	National Legislation Gap (as of before developing the cc Policy)	Specific Research Sub-Guidelines	Specific Research Sub-Procedures	Research Tools	Gender Mainstreaming	Synergies
Overall Rank	Score											
					scientific and technical research capacities and capabilities, particularly in developing countries, and to promote access to, and the exchange of, data and analyses thereof obtained from areas beyond national jurisdiction							
32	68.5	Advance policies and initiatives to promote private sector investment	**UNFCCC articles 3, 4 COP4, COP5, COP6, COP7**	**Climate Change Legal and Institutional Framework**	Same as integrate climate change in current legislative and policy framework.	Obligated only upon existence of fund		• Same as integrate climate change in current legislative and policy framework.	Same as integrate climate change in current legislative and policy framework.	Same as integrate climate change in current legislative and policy	• Same as integrate climate change in current legislative and policy framework.	Only when it requires

Overall Rank and Score of Prioritized Climate Change Research Topics		CLIMATE CHANGE Topic Prioritized (Policy-oriented *Research* Needed to Address National Gaps)	Article in Conventions/National Policy	Mandate	Provisions / Main Themes	Specific obligation to Jordan in Conventions	National Legislation Gap (as of before developing the cc Policy)	Specific Research Sub-Guidelines	Specific Research Sub-Procedures	Research Tools	Gender Mainstreaming	Synergies
Overall Rank	Score											
		(- sectoral and legislative reforms at national level to encourage public-private partnerships).	**National Climate Change Policy for the Hashemite Kingdom of Jordan**					• Review the newly developed Climate Change Policy of Jordan for details on national needs in this regard.		framework.		
33	68.0	Conservation of forests.	**UNFCCC article 4d COP7** CMP.1 COP13 COP15 **COP16**	**Commitments / Sustainable Management**	Promote sustainable management, and promote and cooperate in the conservation and enhancement, as appropriate, of sinks and reservoirs of all greenhouse gases not controlled by the Montreal Protocol, including biomass,	Not and obligation (optional)	Some points are included at the Agricultural strategy; however, other points as SOC sequestration are missing and needs further inclusion at the MoA.	• COP7 "Definitions, modalities, rules and guidelines relating to land use, land-use change and forestry activities" FCCC/CP/2001/13/Add.1 • Sectoral Report For Land Use, Land-Use Change And Forestry • Afforestation, reforestation and use of marginal land • COP13	• Sustainability can be indicated from natural quality for example soil organic carbon content, biomass and forest density as indicators. • Sustainable management requires the knowledge of all systems including soil, biodiversity, and marine environment. • Approaches can be achieved through improving the fertility and environmental conditions for	• Results of impacts and vulnerability analyses • SOC, LULC and LULUCF maps. • Same as biodiversity, degradation and agricultural impacts • Vulnerability results • Computer based programs and statistical tools.	• Gender building capacity, • Perform awareness programs and training in sustainable management, and conservation and enhancement of sinks and reservoirs of all GHGs, • Women access to credit, information and carbon fund markets so that they can learn about and	Synergy with biodiversity through vegetation, in-situ and ex-situ conservation, rehabilitation, sustainable use of components of biological diversity, and biotechnology Synergy with desertification through carbon sequestration, land management, and use of alternative and

Overall Rank and Score of Prioritized Climate Change Research Topics		CLIMATE CHANGE Topic Prioritized (Policy-oriented *Research* Needed to Address National Gaps)	Article in Conventions/National Policy	Mandate	Provisions / Main Themes	Specific obligation to Jordan in Conventions	National Legislation Gap (as of before developing the cc Policy)	Specific Research Sub-Guidelines	Specific Research Sub-Procedures	Research Tools	Gender Mainstreaming	Synergies
Overall Rank	Score											
					forests (afforestation and reforestation) and oceans as well as other terrestrial, coastal and marine ecosystems. Reduce uncertainty relating to the measurement, estimation, assessment of uncertainties, monitoring and reporting of net carbon stock changes and anthropogenic greenhouse gas emissions by sources and removals by sinks in the land use,			"Indicative guidance" FCCC/CP/2007/6/Add.1 • COP15 "Methodological guidance for activities relating to reducing emissions from deforestation and forest degradation and the role of conservation, sustainable management of forests and enhancement of forest carbon stocks in developing countries" FCCC/CP/2009/11/Add.1 • COP16 "Guidance and safeguards for policy approaches and positive incentives on issues relating to reducing	adaptive capacity.Direct and indirect management practice, Baselines scenarios and mitigation scenarios, • Costs and benefits analysis • Uncertainties, barriers and constrain analysis. • Quality assurance/quality control (QA/QC) analysis		decide which resources and technologies can satisfy their needs. • Gender empowerment in sustainable management options, Costs and benefits analysis, uncertainties, barriers and constrain analysis. • Gender employment through local communities in biomass, forests (afforestation and reforestation) and oceans as well as other terrestrial, coastal and marine ecosystems. • Gender participation through workshops.	renewable energy sources

Overall Rank and Score of Prioritized Climate Change Research Topics		CLIMATE CHANGE Topic Prioritized (Policy-oriented *Research* Needed to Address National Gaps)	Article in Conventions/National Policy	Mandate	Provisions / Main Themes	Specific obligation to Jordan in Conventions	National Legislation Gap (as of before developing the cc Policy)	Specific Research Sub-Guidelines	Specific Research Sub-Procedures	Research Tools	Gender Mainstreaming	Synergies
Overall Rank	Score											
					land-use change and forestry sector, and provide positive incentives on issues relating to reducing emissions from deforestation and forest degradation			emissions from deforestation and forest degradation in developing countries; and the role of conservation, sustainable management of forests and enhancement of forest carbon stocks in developing countries" • FCCC/CP/2010/7/Add.1 • Good Practice Guidance for Land Use, Land-Use Change and Forestry. • Review the newly developed Climate Change Policy of Jordan for details on national needs in this regard.			• Women access to perform research and application studies in sustainable management and access funds through small and large projects.	
34	68.0	Inventory of all anthropogeni	**UNFCCC article 4a**	**Commitments / GHG**	Develop, periodically update,	Obligated only upon	There is no specific policy or	• Guidelines for the preparation of national	• Available GHGs sinks are soil, forest and sea.	• LULC and LULUCF maps	• Improve gender building capacity,	Synergy with biodiversity through

Overall Rank and Score of Prioritized Climate Change Research Topics		CLIMATE CHANGE Topic Prioritized (Policy-oriented *Research* Needed to Address National Gaps)	Article in Conventions/National Policy	Mandate	Provisions / Main Themes	Specific obligation to Jordan in Conventions	National Legislation Gap (as of before developing the cc Policy)	Specific Research Sub-Guidelines	Specific Research Sub-Procedures	Research Tools	Gender Mainstreaming	Synergies
Overall Rank	Score											
		c removal sinks of GHGs.	**COP2, COP8, COP9, COP15**	**Inventory**	publish and make available to the COP national inventories of anthropogenic emissions by sources and removals by sinks of all GHG not controlled by the Montreal Protocol	existence of fund	strategy concerning this part, thus updates of MoEnv in corporations with MEMR, MoA, MoT, and MIT are required	communications FCCC/SBSTA/2004/8 and FCCC/SBSTA/2006/9. • Review the newly developed Climate Change Policy of Jordan for details on national needs in this regard.	• Carbon sequestration can be achieved through (i) Hydrocarbon bearing geologic formations, (ii) Saline formations, (iii) Tree plantings, silvicultural practices, and soil reclamation, and (iv) Increased ocean uptake • Approaches are to derive potential forest removal and SOC mapping to the country based on GIS and field sampling.	• Soil management data including farming systems and management at dry lands and soil fertility management practices. • Soil Organic Carbon (SOC) maps, • Spatial and temporal modelling • GIS based models • Statistical Software	• Perform awareness programs • Women training in anthropogenic removal sinks of GHGs especially at soil management, fires, forest, etc, • Gender access to GHGs sinks are soil, forest and sea data, • Gender empowerment in trend and statistical analysis.	vegetation genotype according to spatial location and environment, conservation, forest, tree plantings, silvicultural practices, etc Synergy with desertification through carbon sequestration, and land management
35	67.9	Quantification of GHGs emissions by transportation.	**UNFCCC article 4a COP2, COP8, COP9, COP15**	**Commitments / GHG Inventory**	Develop, periodically update, publish and make available to the COP national inventories of anthropogenic emissions	Obligated only upon existence of fund	There is no specific policy or strategy concerning this part, thus updates of MoEnv in corporations with MEMR,	• Guidelines are set by the UNFCCC in their COP2 8, 9 and COP15 "Quantified economy-wide emissions targets for 2020" FCCC/CP/2009/11/Add.1	• The major emission resources from aall road vehicles, public transportation, Light rail, Off-road vehicles/equipment are negligible. • The major energy types are Gasoline, Diesel, CNG, LNG,	• Transportation data of VMT and AADT • Computer based software as: UNFCCC CRF Reporter, UNFCCC-NAI Software, Emission	• Gender building capacity and training, • Gender employment in transportation sector, • Women access to .data collection,	No

Overall Rank and Score of Prioritized Climate Change Research Topics		CLIMATE CHANGE Topic Prioritized (Policy-oriented *Research* Needed to Address National Gaps)	Article in Conventions/National Policy	Mandate	Provisions / Main Themes	Specific obligation to Jordan in Conventions	National Legislation Gap (as of before developing the cc Policy)	Specific Research Sub-Guidelines	Specific Research Sub-Procedures	Research Tools	Gender Mainstreaming	Synergies
Overall Rank	Score											
					by sources and removals by sinks of all GHG not controlled by the Montreal Protocol		MoA, MoT, and MIT are required	FCCC/CP/1996/15/Add.1 • UNFCCC Reporting on Climate Change user manual for the guidelines on national communications from non-Annex I Parties, 2003. • Review the newly developed Climate Change Policy of Jordan for details on national needs in this regard.	and Bio-diesel. Each has a correction factor depending on the combustion method. • Several methods available as: (1) Provincial Fuel Sales, (2) Jordan Registries Vehicle Data, and (3) Provincial and Municipal • Quantification of GHG by Traffic Volume Counts Vehicle miles travelled (VMT) and Average Annual Daily Traffic (AADT), Segregating Vehicle Kilometres by Vehicle Type, Determining Fuel Consumption by Vehicle Type, Determining GHG Released per Litre of Fuel Burned Data available from transportation	FACtors (EMFAC).		

Overall Rank and Score of Prioritized Climate Change Research Topics		CLIMATE CHANGE Topic Prioritized (Policy-oriented *Research* Needed to Address National Gaps)	Article in Conventions/National Policy	Mandate	Provisions / Main Themes	Specific obligation to Jordan in Conventions	National Legislation Gap (as of before developing the cc Policy)	Specific Research Sub-Guidelines	Specific Research Sub-Procedures	Research Tools	Gender Mainstreaming	Synergies
Overall Rank	Score											
									unit.			
36	67.8	Promote policy-supporting climate change research.	**UNFCCC article 5a COP3 COP4 COP15**	**Research, Systematic Observation, Education, Training and Public Awareness.**	Take climate change considerations into account, to the extent feasible, in their relevant social, economic and environmental policies and actions, and employ appropriate methods, for example impact assessments, formulated and determined nationally, with a view to minimizing adverse effects on the economy, on public health and on the quality of the environment,	Obligated only upon existence of fund	Impact assessment is missing and needs special inclusions at MoSD and MoH.	• UNFCCC reporting guidelines on global climate change observing systems • FCCC/CP/1999/7 • FCCC/CP/1998/16/Add.1 • Guidelines on Climate Watches. Geneva: World Meteorological Organization. • Review the newly developed Climate Change Policy of Jordan for details on national needs in this regard.	• Estimation of both climate and non-climate drivers affect systems. Non-climate drivers such as urbanization and pollution can influence systems directly and indirectly through their effects on climate variables such as albedo and soil-moisture regimes. Socio-economic processes, including land-use change (e.g., forestry to agriculture; agriculture to urban area) and land-cover modification (e.g., ecosystem degradation or restoration) also affect multiple systems. • Climate drivers including the	• Data of temperature and precipitation, Snow cover, Runoff/Stream flow, Floods, Droughts, Water Temperature and chemistry, Groundwater, etc. • Dramatic changes in the distribution of plants and animals • Large-scale climate variations, such as the Pacific Decadal Oscillation (PDO), El Nino-Southern Oscillation (ENSO) and	• Gender building capacity, • Perform awareness programs and training in observations, monitoring, and understanding of radiation forcing, processes and coupling, • , • Gender participation through workshops. • Women access to perform research and access funds through small and large projects.	No

Overall Rank and Score of Prioritized Climate Change Research Topics		CLIMATE CHANGE Topic Prioritized (Policy-oriented *Research* Needed to Address National Gaps)	Article in Conventions/National Policy	Mandate	Provisions / Main Themes	Specific obligation to Jordan in Conventions	National Legislation Gap (as of before developing the cc Policy)	Specific Research Sub-Guidelines	Specific Research Sub-Procedures	Research Tools	Gender Mainstreaming	Synergies
Overall Rank	Score											
					of projects or measures undertaken by them to mitigate or adapt to climate change				cryosphere, hydrology and water resources, marine and freshwater biological systems, terrestrial biological systems, agriculture and forestry. • Non-climate drivers of change including land use, land degradation, urbanization and pollution, affect systems directly and indirectly through their effects on climate. • Trend analysis using regression, correlation and time-series analyses • Sensitivity analysis model-based CCIAV • Systematic observation for meteorological, atmospheric, oceanographic and terrestrial	North Atlantic Oscillation (NAO), GCOS), GCOS, GUAN, GTN-G, GTN-P, and FLUXNET. • The socio-economic processes that drive land-use change include population growth, economic development, trade and migration		

Overall Rank and Score of Prioritized Climate Change Research Topics		CLIMATE CHANGE Topic Prioritized (Policy-oriented *Research* Needed to Address National Gaps)	Article in Conventions/National Policy	Mandate	Provisions / Main Themes	Specific obligation to Jordan in Conventions	National Legislation Gap (as of before developing the cc Policy)	Specific Research Sub-Guidelines	Specific Research Sub-Procedures	Research Tools	Gender Mainstreaming	Synergies
Overall Rank	Score											
									observations of the climate system as identified by the Global Climate Observing System (GCOS), Surface Network GCOS, Upper Air Network (GUAN), Global Terrestrial Network - Glaciers (GTN-G), Global Terrestrial Network - Permafrost (GTN-P), and the Global Terrestrial Network – Carbon (FLUXNET).			
37	67.7	Geographic distribution of renewable sources and analysis of their cost-effectiveness.	**UNFCCC article 4c, COP3, COP4, COP13 COP16**	**Commitments / Stabilization of GHGs, Technologies Transfer, and Finance**	Promote and cooperate in the development, application and diffusion, including transfer, of technologies, practices and processes that control, reduce or prevent anthropogeni	Not an obligation (optional)	Some areas were adopted by the MoEnv at NEEDS, however, updates if possible are required at MEMR, MLTD, MIT, MoMRA	• Application of geographical information systems (GIS) to the development and analysis of geographical constraints and distributions of renewable energy resources and the energy system infrastructure is a new research	• This field requires resource-economics - geographical analysis of distributed energy resources (wind, biomass) by use of geographically determined costs and revenues, development of the GIS-based GRASP model (Geographical Resource Analysis,	• Energy demand, use and supply data • DEM • Spatial and temporal weather data • GHG inventory from energy sector • Computer based programs as	• Gender building capacity, • Perform awareness programs and training in renewable sources, • Gender empowerment in geographical analysis of energy demand and supply, • Gender	Synergy with desertification at use of alternative and renewable energy sources

Overall Rank and Score of Prioritized Climate Change Research Topics		CLIMATE CHANGE Topic Prioritized (Policy-oriented *Research* Needed to Address National Gaps)	Article in Conventions/National Policy	Mandate	Provisions / Main Themes	Specific obligation to Jordan in Conventions	National Legislation Gap (as of before developing the cc Policy)	Specific Research Sub-Guidelines	Specific Research Sub-Procedures	Research Tools	Gender Mainstreaming	Synergies
Overall Rank	Score											
					c emissions of GHG not controlled by the Montreal Protocol in all relevant sectors, including the energy, transport, industry, agriculture, forestry and waste management sectors.		and MoEnv	area aims at improving the mitigation options in energy sector. • Geographical analysis of energy demand and supply in national, regional and local energy systems accounts to be used in energy systems analysis, in particular research into end-use efficiency and infrastructural change. • Review the newly developed Climate Change Policy of Jordan for details on national needs in this regard.	Supply and Planning) of spatially determined costs and environmental effects of renewable energy sources and energy system infrastructure, visibility and visual impact of regional wind power development. Geographical studies using visibility thresholds, intervisibility and landscape character in combination with population, land use and wind energy economics. • GIS based systems and satellite maps. • Costs and benefits analysis • Uncertainties, barriers and constrain analysis. • Transaction and implementation	EnergyPLAN, energyPRO GRID, COMPOSE, Energy BALANCE	employment in mitigation options in energy sector, • Gender participation though workshops. • Women access to perform research and application studies and access funds through small and large projects.	

Overall Rank and Score of Prioritized Climate Change Research Topics		CLIMATE CHANGE Topic Prioritized (Policy-oriented *Research* Needed to Address National Gaps)	Article in Conventions/National Policy	Mandate	Provisions / Main Themes	Specific obligation to Jordan in Conventions	National Legislation Gap (as of before developing the cc Policy)	Specific Research Sub-Guidelines	Specific Research Sub-Procedures	Research Tools	Gender Mainstreaming	Synergies
Overall Rank	Score											
									costs			
38	67.5	Quantification of GHGs emissions by waste sector including solid waste disposal, biological treatment of solid waste, incineration and open burning of waste, and miscellaneous.	**UNFCCC article 4a COP2, COP8, COP9, COP15**	**Commitments / GHG Inventory**	Develop, periodically update, publish and make available to the COP national inventories of anthropogenic emissions by sources and removals by sinks of all GHG not controlled by the Montreal Protocol	Obligated only upon existence of fund	There is no specific policy or strategy concerning this part, thus updates of MoEnv in corporations with MEMR, MoA, MoT, and MIT are required	• Guidelines for the preparation of national communications FCCC/SBSTA/2004/8 and FCCC/SBSTA/2006/9 • 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 5, Waste • UNFCCC Reporting on Climate Change user manual for the guidelines on national communications from non-Annex I Parties, 2003. • Review the newly developed Climate Change Policy of Jordan for details on national needs	• GHGs emissions are directly estimated from Municipal Solid Waste (MSW), Sludge, Industrial waste, and other waste according to composition. • GHGs emissions can be estimated through fraction analysis upon availability of data. • Waste are categorized into municipal solid waste, sludge, industrial waste and other as clinical waste, hazardous waste, agricultural waste • GHGs emission should be estimated upon treatment type and incineration method adopted. • There are two sources of emissions associated with	• Country-specific data on MSW generation and management practices can be obtained from waste statistics, surveys (municipal or other relevant administration, waste management companies, waste association organisations, MoEnv, other) and research projects (World Bank, OECD, ADB, JICA, U.S.EPA, IIASA, EEA, etc.).Computer based programs as : 1. UNFCCC-NAI	• Improve gender building capacity, • Perform awareness programs and women training in GHGs emissions from waste sector • Gender access to GHGs emissions data, • Using a "bottom-up" model to assess marginalized people's knowledge especially at household waste; garden (yard) and park waste.	No

Overall Rank and Score of Prioritized Climate Change Research Topics		CLIMATE CHANGE Topic Prioritized (Policy-oriented *Research* Needed to Address National Gaps)	Article in Conventions/National Policy	Mandate	Provisions / Main Themes	Specific obligation to Jordan in Conventions	National Legislation Gap (as of before developing the cc Policy)	Specific Research Sub-Guidelines	Specific Research Sub-Procedures	Research Tools	Gender Mainstreaming	Synergies
Overall Rank	Score											
								in this regard.	the landfilled waste that should be included in the GHG inventory. The first is methane being produced at landfills located within the jurisdiction's boundary, and the second is the estimated future generation of methane associated with waste being produced by entities residing in the jurisdiction during the base year (community generated waste). • Direct measurements of Household waste; Garden (yard) and park waste; and commercial/institutional waste. • Trend analysis • Waste stream analyses.	Software 2. Durable Goods Calculator 3. Landfill Gas Energy Benefits Calculator 4. Recycled Content (ReCon) Tool 5. Waste Reduction Model (WARM)		

Overall Rank and Score of Prioritized Climate Change Research Topics		CLIMATE CHANGE Topic Prioritized (Policy-oriented *Research* Needed to Address National Gaps)	Article in Conventions/National Policy	Mandate	Provisions / Main Themes	Specific obligation to Jordan in Conventions	National Legislation Gap (as of before developing the cc Policy)	Specific Research Sub-Guidelines	Specific Research Sub-Procedures	Research Tools	Gender Mainstreaming	Synergies
Overall Rank	Score											
39	67.2	Creation of data banking and public access to information on climate change related issues.	**UNFCCC articles 4, 5 COP3 COP4 COP15** **National Climate Change Policy for the Hashemite Kingdom of Jordan**	**Research, Systematic Observation, Education, Training and Public Awareness.**	• Support and further develop, as appropriate, international and intergovernmental programmes and networks or organizations aimed at defining, conducting, assessing and financing research, data collection and systematic observation, taking into account the need to	Obligated only upon existence of fund	Only available at MoEnv and JMD, however, there is no policy or strategy covers this part and needs corporation of the two parties in addition other related ministries at the impact part. Environmental Information Networking needs activation at MoEnv.	• Developing of data banking in relevance to climate change issues nationally, regional, and globally can facilitate inter-relations and connections between decision makers or community and researcher and private sectors. • FCCC/CP/1998/16/Add.1 • Review the newly developed Climate Change Policy of Jordan for details on national needs in this regard.	• Exchange of information through global networks and dissemination of technology.	• Establishing of database unit at the MoEnv • Corporation between ministries • Access to research institutions/ NGOs/private sectors to add and implement results • Computer networking • Develop legal and institutional framework	• Gender building capacity, • Women empowerment in CC data banking, • Gender participation through workshops. • Women access to CC data.	With all

Overall Rank and Score of Prioritized Climate Change Research Topics		CLIMATE CHANGE Topic Prioritized (Policy-oriented *Research* Needed to Address National Gaps)	Article in Conventions/National Policy	Mandate	Provisions / Main Themes	Specific obligation to Jordan in Conventions	National Legislation Gap (as of before developing the cc Policy)	Specific Research Sub-Guidelines	Specific Research Sub-Procedures	Research Tools	Gender Mainstreaming	Synergies
Overall Rank	Score											
					minimize duplication of effort; • Support international and intergovernmental efforts to strengthen systematic observation and national scientific and technical research capacities and capabilities, particularly in developing countries, and to promote access to, and the exchange of, data and analyses thereof							

Overall Rank and Score of Prioritized Climate Change Research Topics		CLIMATE CHANGE Topic Prioritized (Policy-oriented *Research* Needed to Address National Gaps)	Article in Conventions/National Policy	Mandate	Provisions / Main Themes	Specific obligation to Jordan in Conventions	National Legislation Gap (as of before developing the cc Policy)	Specific Research Sub-Guidelines	Specific Research Sub-Procedures	Research Tools	Gender Mainstreaming	Synergies
Overall Rank	Score											
					obtained from areas beyond national jurisdiction							

Overall Rank and Score of Prioritized Climate Change Research Topics		CLIMATE CHANGE Topic Prioritized (Policy-oriented *Research* Needed to Address National Gaps)	Article in Conventions/National Policy	Mandate	Provisions / Main Themes	Specific obligation to Jordan in Conventions	National Legislation Gap (as of before developing the cc Policy)	Specific Research Sub-Guidelines	Specific Research Sub-Procedures	Research Tools	Gender Mainstreaming	Synergies
Overall Rank	Score											
40	67.1	Community-based network in all relevant sectors (including energy, transport, industry, agriculture, forestry and waste management sectors).	**UNFCCC articles 4, 5 COP3 COP4 COP15** **National Climate Change Policy for the Hashemite Kingdom of Jordan**	**Research, Systematic Observation, Education, Training and Public Awareness.**	• Support and further develop, as appropriate, international and intergovernmental programmes and networks or organizations aimed at defining, conducting, assessing and financing research, data collection and systematic observation, taking into account the need to	Obligated only upon existence of fund	Only available at MoEnv and JMD, however, there is no policy or strategy covers this part and needs corporation of the two parties in addition other related ministries at the impact part. Environmental Information Networking needs activation at MoEnv.	• Developing of data banking in relevance to climate change issues nationally, regional, and globally can facilitate inter-relations and connections between decision makers or community and researcher and private sectors. • Review the newly developed Climate Change Policy of Jordan for details on national needs in this regard.	• Exchange of information through global networks and dissemination of technology.	• Establishing of database unit at the MoEnv • Corporation between ministries • Access to research institutions/ NGOs/private sectors to add and implement results • Computer networking • Develop legal and institutional framework	• Gender building capacity, • Women empowerment in CC data banking, • Gender participation through workshops. • Women access to CC data.	With all

Overall Rank and Score of Prioritized Climate Change Research Topics		CLIMATE CHANGE Topic Prioritized (Policy-oriented *Research* Needed to Address National Gaps)	Article in Conventions/National Policy	Mandate	Provisions / Main Themes	Specific obligation to Jordan in Conventions	National Legislation Gap (as of before developing the cc Policy)	Specific Research Sub-Guidelines	Specific Research Sub-Procedures	Research Tools	Gender Mainstreaming	Synergies
Overall Rank	Score											
					minimize duplication of effort; • Support international and intergovernmental efforts to strengthen systematic observation and national scientific and technical research capacities and capabilities, particularly in developing countries, and to promote access to, and the exchange of, data and analyses thereof							

Overall Rank and Score of Prioritized Climate Change Research Topics		CLIMATE CHANGE Topic Prioritized (Policy-oriented *Research* Needed to Address National Gaps)	Article in Conventions/National Policy	Mandate	Provisions / Main Themes	Specific obligation to Jordan in Conventions	National Legislation Gap (as of before developing the cc Policy)	Specific Research Sub-Guidelines	Specific Research Sub-Procedures	Research Tools	Gender Mainstreaming	Synergies
Overall Rank	Score											
					obtained from areas beyond national jurisdiction							
41	67.0	Quantification of GHGs emissions by water sector including Wastewater Treatment and Discharge and Miscellaneou	**UNFCCC article 4a COP2, COP8, COP9, COP15**	**Commitments / GHG Inventory**	Develop, periodically update, publish and make available to the COP national inventories of anthropogenic emissions by sources	Obligated only upon existence of fund	There is no specific policy or strategy concerning this part, thus updates of MoEnv in corporations with MWI are required	• Guidelines for the preparation of national communications FCCC/SBSTA/2004/8 and FCCC/SBSTA/2006/9 • UNFCCC Guidelines On Common Practice	• Quantification Domestic wastewater and Industrial wastewater • Wastes data are collected from each source and categorized according to type. • Wastewater can be a source of methane (CH_4)	• Wastewater discharge quantities and qualities data obtained from MWI including types of treatment used at each unit • Computer	• Improve gender building capacity, • Perform awareness programs and women training in GHGs emissions from water sector • Gender access to GHGs emissions data,	No

Overall Rank and Score of Prioritized Climate Change Research Topics		CLIMATE CHANGE Topic Prioritized (Policy-oriented *Research* Needed to Address National Gaps)	Article in Conventions/National Policy	Mandate	Provisions / Main Themes	Specific obligation to Jordan in Conventions	National Legislation Gap (as of before developing the cc Policy)	Specific Research Sub-Guidelines	Specific Research Sub-Procedures	Research Tools	Gender Mainstreaming	Synergies
Overall Rank	Score											
		s.			and removals by sinks of all GHG not controlled by the Montreal Protocol			• UNFCCC Reporting On Climate Change user manual for the guidelines on national communications from non-Annex I Parties, 2003. • Review the newly developed Climate Change Policy of Jordan for details on national needs in this regard.	when treated or disposed anaerobically. It can also be a source of nitrous oxide (N_2O) emissions. • GHGs emissions vary by treatment and discharge systems types. • Approaches of GHGs emission quantification are: (1) applies default values for the emission factor and activity parameters, (2) incorporation of a country specific emission factor and country specific activity data. (3) based on plant-specific data from large wastewater treatment facilities • Direct estimation of GHGs emission by wastewater type or indirect through emission	based software as: UNFCCC-NAI Software, etc.	• Gender employment in water sector and data collection.	

Overall Rank and Score of Prioritized Climate Change Research Topics		CLIMATE CHANGE Topic Prioritized (Policy-oriented *Research* Needed to Address National Gaps)	Article in Conventions/National Policy	Mandate	Provisions / Main Themes	Specific obligation to Jordan in Conventions	National Legislation Gap (as of before developing the cc Policy)	Specific Research Sub-Guidelines	Specific Research Sub-Procedures	Research Tools	Gender Mainstreaming	Synergies
Overall Rank	Score											
									• factor and trend analysis. • Time series consistency.			
42	66.8	Quantification of GHGs emissions by industrial sector (industrial processes and product use) this include mineral industry, chemical industry, metal industry, non-energy products, electronics industry, product uses as substitutes for ozone depleting substances, other	**UNFCCC article 4a COP2, COP8, COP9, COP15**	**Commitments / GHG Inventory**	Develop, periodically update, publish and make available to the COP national inventories of anthropogenic emissions by sources and removals by sinks of all GHG not controlled by the Montreal Protocol	Obligated only upon existence of fund	There is no specific policy or strategy concerning this part, thus updates of MoEnv in corporations with MEMR, MoA, MoT, and MIT are required	• Guidelines are set by the UNFCCC in their COP2, 8, 9 and COP15 "Quantified economy-wide emissions targets for 2020" FCCC/CP/2009/11/Add.1 FCCC/CP/1996/15/Add.1 • Guidelines for the preparation of national communications FCCC/SBSTA/2004/8 and FCCC/SBSTA/2006/9 • 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 3, Industrial Processes, and	• GHG emissions are subdivided according to industrial product type that can be estimated directly and indirectly. • For example cement production have several deliverables and products each which have a certain emission correction factor. • Several methods used as: emission factor-based method, the mass balance method, the predictive emissions monitoring system (PEMS) and the continuing emissions monitoring system (CEMS). • Direct estimation	• GHGs counts by type or by product within each industrial category. • Consumption data on electricity and natural gas supplied directly from utilities. • Computer based software as: UNFCCC CRF Reporter ,UNFCCC-NAI Software, Emissions & Generation Resource Integrated Database (eGRID), Green Power Equivalency Calculator, Power	• Gender building capacity and training, • Gender employment in industrial sector, • Gender access in data collection, • Using a "bottom-up" model to assess marginalized people's knowledge.	No

Overall Rank and Score of Prioritized Climate Change Research Topics		CLIMATE CHANGE Topic Prioritized (Policy-oriented *Research* Needed to Address National Gaps)	Article in Conventions/National Policy	Mandate	Provisions / Main Themes	Specific obligation to Jordan in Conventions	National Legislation Gap (as of before developing the cc Policy)	Specific Research Sub-Guidelines	Specific Research Sub-Procedures	Research Tools	Gender Mainstreaming	Synergies
Overall Rank	Score											
		product manufacture and use, and miscellaneous.						Product Use • UNFCCC Reporting On Climate Change user manual for the guidelines on national communications from non-Annex I Parties, 2003	by unit/product. • In direct using trend analysis from available data. • Develop a consistent time series.	Profiler, etc.		
43	66.4	Design an effective system to "measure, report, and verify" "MRV" of greenhouse gas inventory.	**UNFCCC article 4a COP2, COP8, COP9, COP15** **National Climate Change Policy for the Hashemite Kingdom of Jordan**	**Commitments / GHG Inventory**	Develop, periodically update, publish and make available to the COP national inventories of anthropogenic emissions by sources and removals by sinks of all GHG not controlled by the Montreal Protocol	Obligated only upon existence of fund	There is no specific policy or strategy concerning this part, thus updates of MoEnv in corporations with MEMR, MoA, MoT, and MIT are required	• Guidelines are set by the UNFCCC in their COP 2, 8, 9 and COP 15 "Quantified economy-wide emissions targets for 2020" FCCC/CP/2009/11/Add.1 FCCC/CP/1996/15/Add.1 • Guidelines for the preparation of national communications FCCC/SBSTA/2004/8 and FCCC/SBSTA/2006/9 • 2006 IPCC	• There are two approaches for collecting activity data: "top down" and "bottom up." Top-down inventories rely on data collected and aggregated by state, national, and international agencies. • Inventories that use a bottom-up approach generally collect and aggregate data from local end users, such as utilities. • Gap analysis in data set (including filling gaps in periodic data, time	• Gathering data from (1) National Statistics Agencies, (2) Sectoral experts, stakeholder organizations, (3) Other national experts, (4) IPCC Emission Factor Database, (5) Other international experts, (6) International organizations publishing statistics, (7) Reference	• Gender building capacity and training, • Using a "bottom-up" model to assess marginalized people's knowledge.	No

Overall Rank and Score of Prioritized Climate Change Research Topics		CLIMATE CHANGE Topic Prioritized (Policy-oriented *Research* Needed to Address National Gaps)	Article in Conventions/National Policy	Mandate	Provisions / Main Themes	Specific obligation to Jordan in Conventions	National Legislation Gap (as of before developing the cc Policy)	Specific Research Sub-Guidelines	Specific Research Sub-Procedures	Research Tools	Gender Mainstreaming	Synergies
Overall Rank	Score											
								Guidelines for National Greenhouse Gas Inventories, Volume 1, General Guidance and Reporting • 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2, Energy • UNFCCC Reporting on Climate Change user manual for the guidelines on national communications from non-Annex I Parties, 2003. • Review the newly developed Climate Change Policy of Jordan for details on national needs in this regard.	series revision, incorporating improved data, compensating for deteriorating data, incomplete coverage). • Quality assurance/quality control (QA/QC) analysis.	libraries, (8) Scientific and technical articles in environmental books, journals and reports, (9) Universities, (10) Web search for organizations & specialists, (11) National Inventory Reports from Parties to the UNFCCC. • Computer based programs as: UNFCCC CRF Reporter, UNFCCC-NAI Software, Clean Air and Climate Protection Software, Climate CHECK, ENERGY STAR Portfolio Manager.		

Overall Rank and Score of Prioritized Climate Change Research Topics		CLIMATE CHANGE Topic Prioritized (Policy-oriented *Research* Needed to Address National Gaps)	Article in Conventions/National Policy	Mandate	Provisions / Main Themes	Specific obligation to Jordan in Conventions	National Legislation Gap (as of before developing the cc Policy)	Specific Research Sub-Guidelines	Specific Research Sub-Procedures	Research Tools	Gender Mainstreaming	Synergies
Overall Rank	Score											
										• Local Government Greenhouse Gas Protocol. • Office Carbon Footprint Tool. • Regional Greenhouse Gas Protocol. • Calculators as GHG Equivalency Calculator and Personal Emissions Calculator, etc.		
44	66.0	Assessing constraints and gaps for technology transfer.	**UNFCCC article 4c, COP3, COP4, COP13 COP16**	**Commitments / Stabilization of GHGs, Technologies Transfer, and Finance**	Promote and cooperate in the development, application and diffusion, including transfer, of technologies, practices and processes that control, reduce or prevent	Not an obligation (optional)	Some areas were adopted by the MoEnv at NEEDS, however, updates if possible are required at MEMR, MLTD, MIT, MoMRA	• Cooperate in technology transfer could be achieved through community based network and research development • COP13, FCCC/CP/2007/6/Add.1 FCCC/SBSTA/2006/INF.4. • Regional and	• Analysis of potential new technologies implementation • Impact analysis • Baseline and mitigation scenarios • Costs and benefits analysis • Uncertainties, barriers and constrain analysis.	• GHG inventory • Impacts and vulnerability results	• Gender building capacity, • Perform awareness programs and training in low GHG emitting technologies, • Gender empowerment in ancillary benefits, the costs of damages, impacts of	Only when it requires

Overall Rank and Score of Prioritized Climate Change Research Topics		CLIMATE CHANGE Topic Prioritized (Policy-oriented *Research* Needed to Address National Gaps)	Article in Conventions/National Policy	Mandate	Provisions / Main Themes	Specific obligation to Jordan in Conventions	National Legislation Gap (as of before developing the cc Policy)	Specific Research Sub-Guidelines	Specific Research Sub-Procedures	Research Tools	Gender Mainstreaming	Synergies
Overall Rank	Score											
					anthropogenic emissions of GHG not controlled by the Montreal Protocol in all relevant sectors, including the energy, transport, industry, agriculture, forestry and waste management sectors.		and MoEnv	global climate change impacts associated with different GHG stabilization levels and pathways and their likelihood by region, system and sector; • Develop of new methodologies, technologies, timing and costs of adaptation. • Review the newly developed Climate Change Policy of Jordan for details on national needs in this regard.			response measures, and constraints and opportunities. • Gender participation in low GHG emitting technologies through workshops. • Women access to perform research and application studies and access funds through small and large projects.	
45	65.1	Assessing potential measures to reduce GHG emissions from other resources and activities	**UNFCCC article 4b\ COP13 COP15 COP16**	**Commitments / GHG Mitigation**	Formulate, implement, publish and regularly update national and, where appropriate, regional	Not an obligation (optional)	Well established strategies exist at MEMR and laws at MoEnv, however	• COP15 "Nationally appropriate mitigation actions of developing country Parties" FCCC/CP/2009/11/Add.1	• Costs and benefits analysis • Uncertainties, barriers and constrain analysis.	• Legal and institutional framework Outputs of GHG inventory • Outputs of CC impacts • Direct and	• Perform awareness programs and training in energy conservation techniques, enhance waste collection and	No

Overall Rank and Score of Prioritized Climate Change Research Topics		CLIMATE CHANGE Topic Prioritized (Policy-oriented *Research* Needed to Address National Gaps)	Article in Conventions/National Policy	Mandate	Provisions / Main Themes	Specific obligation to Jordan in Conventions	National Legislation Gap (as of before developing the cc Policy)	Specific Research Sub-Guidelines	Specific Research Sub-Procedures	Research Tools	Gender Mainstreaming	Synergies
Overall Rank	Score											
		such as buildings and residential facilities, etc).			programmes containing measures to mitigate climate change by addressing anthropogenic emissions by sources and removals by sinks of all GHGs not controlled by the Montreal Protocol Integrity using markets to enhance the cost-effectiveness of, and to promote, mitigation actions through stimulating mitigation across broad segments of the economy, safeguarding		MoA, MoT, and MIT strategies requires further inclusions.	• General Guidelines On The Use Of Scenario Data For Climate Impact And Adaptation Assessment, Task Group on Data and Scenario Support for Impact and Climate Assessment (TGICA), IPCC, 2007. • Review the newly developed Climate Change Policy of Jordan for details on national needs in this regard.		indirect economic impacts • New technologies for GHG stabilizations at local scale • National development goals • Implementation policies • Sustainability options • Field evaluations and uncertainty • Market efficiency • Transaction and implementation costs	management, conservation of land, water and natural vegetation, conservation • Gender empowerment in GHG abatement technologies, and Costs and benefits analysis • Gender access mitigation through workshops. • Women access to perform mitigation research and application for funds through small and large projects.	

Overall Rank and Score of Prioritized Climate Change Research Topics		CLIMATE CHANGE Topic Prioritized (Policy-oriented *Research* Needed to Address National Gaps)	Article in Conventions/National Policy	Mandate	Provisions / Main Themes	Specific obligation to Jordan in Conventions	National Legislation Gap (as of before developing the cc Policy)	Specific Research Sub-Guidelines	Specific Research Sub-Procedures	Research Tools	Gender Mainstreaming	Synergies
Overall Rank	Score											
					environmental, and ensuring good governance and robust market functioning and regulation							
46	65.0	Assessing barriers and understanding possible hurdles of engaging the private sector in providing technical solutions to the implementation of and investing in NAMAs projects and identifying the right incentives to engage the	**UNFCCC article 4c, COP3, COP4, COP13 COP16**	**Commitments / Stabilization of GHGs, Technologies Transfer, and Finance**	Promote and cooperate in the development, application and diffusion, including transfer, of technologies, practices and processes that control, reduce or prevent anthropogenic emissions of GHG not controlled by the Montreal Protocol in all relevant sectors, including the energy,	Not an obligation (optional)	Some areas were adopted by the MoEnv at NEEDS, however, updates if possible are required at MEMR, MLTD, MIT, MoMRA and MoEnv	• Cooperate in technology transfer could be achieved through community based network and research development • COP13, FCCC/CP/2007/6/Add.1 FCCC/SBSTA/2006/INF.4. • Regional and global climate change impacts associated with different GHG stabilization levels and pathways and their likelihood by region,	• Analysis of potential new technologies implementation • Impact analysis • Baseline and mitigation scenarios • Costs and benefits analysis • Uncertainties, barriers and constrain analysis.	• GHG inventory • Impacts and vulnerability results	• Gender building capacity, • Perform awareness programs and training in low GHG emitting technologies, • Gender empowerment in ancillary benefits, the costs of damages, impacts of response measures, and constraints and opportunities. • Gender participation in low GHG emitting technologies	Only when it requires

Overall Rank and Score of Prioritized Climate Change Research Topics		CLIMATE CHANGE Topic Prioritized (Policy-oriented *Research* Needed to Address National Gaps)	Article in Conventions/National Policy	Mandate	Provisions / Main Themes	Specific obligation to Jordan in Conventions	National Legislation Gap (as of before developing the cc Policy)	Specific Research Sub-Guidelines	Specific Research Sub-Procedures	Research Tools	Gender Mainstreaming	Synergies
Overall Rank	Score											
		private sector in this process.			transport, industry, agriculture, forestry and waste management sectors; Create an enabling environment to help further stimulate private-sector investment in, and transfer of, environmentally sound technologies; and know-how to developing countries and to promote the implementation of endogenous know-how.			system and sector; • Develop of new methodologies, technologies, • timing and costs of adaptation; • Review the newly developed Climate Change Policy of Jordan for details on national needs in this regard.			through workshops. • Women access to perform research and application studies and access funds through small and large projects.	
47	64.5	International comparisons	**UNFCCC articles**	**Research, Systemati**	• Support and further	Obligated only	Only available at	• Provide incentives and high taxation	Comparison analysis between countries	• Economic assessment of the	• Gender building capacity,	With all

Overall Rank and Score of Prioritized Climate Change Research Topics		CLIMATE CHANGE Topic Prioritized (Policy-oriented *Research* Needed to Address National Gaps)	Article in Conventions/National Policy	Mandate	Provisions / Main Themes	Specific obligation to Jordan in Conventions	National Legislation Gap (as of before developing the cc Policy)	Specific Research Sub-Guidelines	Specific Research Sub-Procedures	Research Tools	Gender Mainstreaming	Synergies
Overall Rank	Score											
		and regional network to climate change related field to promote scientific, technological, technical, socio-economic exchange.	**4, 5 COP3 COP4 COP15** **National Climate Change Policy for the Hashemite Kingdom of Jordan**	**c Observation, Education, Training and Public Awareness.**	develop, as appropriate, international and intergovernmental programmes and networks or organizations aimed at defining, conducting, assessing and financing research, data collection and systematic observation, taking into account the need to minimize duplication of effort;	upon existence of fund	MoEnv and JMD, however, there is no policy or strategy covers this part and needs corporation of the two parties in addition other related ministries at the impact part. Environmental Information Networking needs activation at MoEnv.	and customs on modern technology. • Develop legislative and institutional framework • Developing partnerships with other countries for regional scale analysis, data banking and to promote scientific, technological, technical, socio-economic exchange • FCCC/CP/1998/16/Add.1 •		adverse effects of climate change at global and regional scales; • Integrated joint research and training programs with various sectors;	• Women training in climate change impacts, vulnerabilities, mitigation and adaptation • Women empowerment in CC unit base system, • Gender participation through workshops. • Women access to CC research and access funds. • Support thematic expertise on gender issue, availability of gender-disaggregated information, and staff accountability mechanisms for gender mainstreaming	

Overall Rank and Score of Prioritized Climate Change Research Topics		CLIMATE CHANGE Topic Prioritized (Policy-oriented *Research* Needed to Address National Gaps)	Article in Conventions/National Policy	Mandate	Provisions / Main Themes	Specific obligation to Jordan in Conventions	National Legislation Gap (as of before developing the cc Policy)	Specific Research Sub-Guidelines	Specific Research Sub-Procedures	Research Tools	Gender Mainstreaming	Synergies
Overall Rank	Score											
					• Support international and intergovernmental efforts to strengthen systematic observation and national scientific and technical research capacities and capabilities, particularly in developing countries, and to promote access to, and the exchange of, data and analyses thereof obtained from areas beyond							

Overall Rank and Score of Prioritized Climate Change Research Topics		CLIMATE CHANGE Topic Prioritized (Policy-oriented *Research* Needed to Address National Gaps)	Article in Conventions/National Policy	Mandate	Provisions / Main Themes	Specific obligation to Jordan in Conventions	National Legislation Gap (as of before developing the cc Policy)	Specific Research Sub-Guidelines	Specific Research Sub-Procedures	Research Tools	Gender Mainstreaming	Synergies
Overall Rank	Score											
					national jurisdiction							
48	64.3	Analysis of the ancillary benefits, the costs of damages, impacts of response measures, and constraints and opportunities for the adoption of low GHG emitting technologies.	**UNFCCC article 4c, COP3, COP4, COP13 COP16**	**Commitments / Stabilization of GHGs, Technologies Transfer, and Finance**	Promote and cooperate in the development, application and diffusion, including transfer, of technologies, practices and processes that control, reduce or prevent anthropogenic emissions of GHG not controlled by the Montreal Protocol in all relevant sectors, including the energy, transport, industry, agriculture, forestry and waste management sectors.	Not an obligation (optional)	Some areas were adopted by the MoEnv at NEEDS, however, updates if possible are required at MEMR, MLTD, MIT, MoMRA and MoEnv	• To a large extent, policies for limiting emissions of GHGs have been analyzed in terms of their costs and potential for reducing the rate of increase in atmospheric concentrations of these gases. However, actions to slow atmospheric GHG accumulation could have a number of other impacts, such as a reduction in conventional environmental pollutants. The benefits (or costs) that result are often referred to as "ancillary" to	• Analysis of potential new technologies implementation • Impact analysis • Baseline and mitigation scenarios • Costs and benefits analysis • Uncertainties, barriers and constrain analysis.	• GHG inventory • Impacts and vulnerability results	• Gender building capacity, • Perform awareness programs and training in low GHG emitting technologies, • Gender empowerment in ancillary benefits, the costs of damages, impacts of response measures, and constraints and opportunities. • Gender participation in low GHG emitting technologies through workshops. • Women access to perform research and application studies and	Only when it requires

Overall Rank and Score of Prioritized Climate Change Research Topics		CLIMATE CHANGE Topic Prioritized (Policy-oriented *Research* Needed to Address National Gaps)	Article in Conventions/National Policy	Mandate	Provisions / Main Themes	Specific obligation to Jordan in Conventions	National Legislation Gap (as of before developing the cc Policy)	Specific Research Sub-Guidelines	Specific Research Sub-Procedures	Research Tools	Gender Mainstreaming	Synergies
Overall Rank	Score											
								the benefits and costs of GHG abatement • Low GHG emitting technologies are hypothesised to reduce the cost of damages and impacts. Although it might be not a cost effective, however, ancillary benefits and opportunities might over come through proper funding. • Review the newly developed Climate Change Policy of Jordan for details on national needs in this regard.			access funds through small and large projects.	
49	63.1	Likelihood, magnitude and timescale of large	**UNFCCC articles 3, 4, 5 COP3 COP4**	**Research, Systematic Observation,**	• Promote and cooperate in scientific,	Obligated only upon existence of	Only available at MoEnv and JMD, however,	Rapid-onset meteorological hazards with the potential to cause the	Likelihood, magnitude and timescale of large impacts and abrupt or irreversible events	• Data of extreme river floods, droughts, and	• Gender building capacity, • Perform awareness programs and	Only at risk assessment

Overall Rank and Score of Prioritized Climate Change Research Topics		CLIMATE CHANGE Topic Prioritized (Policy-oriented *Research* Needed to Address National Gaps)	Article in Conventions/National Policy	Mandate	Provisions / Main Themes	Specific obligation to Jordan in Conventions	National Legislation Gap (as of before developing the cc Policy)	Specific Research Sub-Guidelines	Specific Research Sub-Procedures	Research Tools	Gender Mainstreaming	Synergies
Overall Rank	Score											
		impacts and abrupt or irreversible events.	**COP15**	**Education, Training and Public Awareness.**	technological, technical, socio-economic and other research, systematic observation and development of data archives related to the climate system and intended to further the understanding and to reduce or eliminate the remaining uncertainties regarding the causes, effects, magnitude	fund	there is no policy or strategy covers this part and needs corporation of the two parties in addition other related ministries at the impact part. Environmental Information Networking needs activation at MoEnv.	greatest destruction to property and lives include extreme river floods, intense tropical and extra-tropical cyclone windstorms (along with their associated coastal storm surges), as well as the most severe super-cell thunderstorms.	can be studied through: • Counts of natural disasters • Use of global catalogue of catastrophe losses • statistically significant trend for annual catastrophe loss	economic and insurance losses.	training,, • Women empowerment in likelihood, magnitude and timescale analysis, • Gender participation through workshops. • Women access to perform research on CC effect of human health and access funds through small and large projects.	

Overall Rank and Score of Prioritized Climate Change Research Topics		CLIMATE CHANGE Topic Prioritized (Policy-oriented *Research* Needed to Address National Gaps)	Article in Conventions/National Policy	Mandate	Provisions / Main Themes	Specific obligation to Jordan in Conventions	National Legislation Gap (as of before developing the cc Policy)	Specific Research Sub-Guidelines	Specific Research Sub-Procedures	Research Tools	Gender Mainstreaming	Synergies
Overall Rank	Score											
					and timing of climate change and the economic and social consequences of various response strategies. • Support the regional and global observational systems developed under the Global Climate Observing System, the Global Ocean Observing System and the Global Terrestrial Observing System, through appropriat							

Overall Rank and Score of Prioritized Climate Change Research Topics		CLIMATE CHANGE Topic Prioritized (Policy-oriented *Research* Needed to Address National Gaps)	Article in Conventions/National Policy	Mandate	Provisions / Main Themes	Specific obligation to Jordan in Conventions	National Legislation Gap (as of before developing the cc Policy)	Specific Research Sub-Guidelines	Specific Research Sub-Procedures	Research Tools	Gender Mainstreaming	Synergies
Overall Rank	Score											
					e funding mechanisms and support national terrestrial networks including observational programmes to collect, exchange and preserve terrestrial data.							
50	62.9	Conservation of oceans as well as other terrestrial, coastal and marine ecosystems.	**UNFCCC article 4d COP7** CMP.1 COP13 COP15 **COP16**	**Commitments / Sustainable Management**	Promote sustainable management, and promote and cooperate in the conservation and enhancement, as appropriate, of sinks and reservoirs of all greenhouse gases not	Not and obligation (optional)	Some points are included at the Agricultural strategy; however, other points as SOC sequestration are missing and needs	• FCCC/CP/2001/13/Add.1 • Sectoral Report For Land Use, • COP13 "Indicative guidance" FCCC/CP/2007/6/Add.1 • FCCC/CP/2009/11/Add.1 • FCCC/CP/2010/7/Add.1 • Good Practice Guidance for Land Use, Land-	• Sustainable management requires the knowledge of all systems including soil, biodiversity, and marine environment. • Direct and indirect management practice, Baselines scenarios and mitigation scenarios, • Costs and benefits analysis	• Results of impacts and vulnerability analyses • Vulnerability results • Computer based programs and statistical tools.	• Gender building capacity, • Perform awareness programs and training in sustainable management, and conservation and enhancement of sinks and reservoirs of all GHGs, • Women access	Synergy with biodiversity through vegetation, in-situ and ex-situ conservation, rehabilitation, sustainable use of components of biological diversity, and biotechnology

Overall Rank and Score of Prioritized Climate Change Research Topics		CLIMATE CHANGE Topic Prioritized (Policy-oriented *Research* Needed to Address National Gaps)	Article in Conventions/National Policy	Mandate	Provisions / Main Themes	Specific obligation to Jordan in Conventions	National Legislation Gap (as of before developing the cc Policy)	Specific Research Sub-Guidelines	Specific Research Sub-Procedures	Research Tools	Gender Mainstreaming	Synergies
Overall Rank	Score											
					controlled by the Montreal Protocol, including biomass, forests (afforestation and reforestation) and oceans as well as other terrestrial, coastal and marine ecosystems. Reduce uncertainty relating to the measurement, estimation, assessment of uncertainties, monitoring and reporting of net carbon stock changes and anthropogenic greenhouse gas		further inclusion at the MoA.	Use Change and Forestry. • Review the newly developed Climate Change Policy of Jordan for details on national needs in this regard.	• Uncertainties, barriers and constrain analysis. • Quality assurance/quality control (QA/QC) analysis		to credit, information and carbon fund markets so that they can learn about and decide which resources and technologies can satisfy their needs. • Gender empowerment in sustainable management options, Costs and benefits analysis, uncertainties, barriers and constrain analysis. • Gender employment through local communities in biomass, forests (afforestation and reforestation) and oceans as well as other terrestrial, coastal and marine	

Overall Rank and Score of Prioritized Climate Change Research Topics		CLIMATE CHANGE Topic Prioritized (Policy-oriented *Research* Needed to Address National Gaps)	Article in Conventions/National Policy	Mandate	Provisions / Main Themes	Specific obligation to Jordan in Conventions	National Legislation Gap (as of before developing the cc Policy)	Specific Research Sub-Guidelines	Specific Research Sub-Procedures	Research Tools	Gender Mainstreaming	Synergies
Overall Rank	Score											
					emissions by sources and removals by sinks in the land use, land-use change and forestry sector, and provide positive incentives on issues relating to reducing emissions from deforestation and forest degradation						ecosystems. • Gender participation through workshops. • Women access to perform research and application studies in sustainable management and access funds through small and large projects.	
51	62.7	National technology needs assessment and improve methodologies, technologies, timing and costs of mitigation measures	**UNFCCC article 4c, COP3, COP4, COP13 COP16**	**Commitments / Stabilization of GHGs, Technologies Transfer, and Finance**	Promote and cooperate in the development, application and diffusion, including transfer, of technologies, practices and processes that control,	Not an obligation (optional)	Some areas were adopted by the MoEnv at NEEDS, however, updates if possible are required at MEMR, MLTD, MIT,	• Cooperate in technology transfer could be achieved through community based network and research development • COP13, FCCC/CP/2007/6/Add.1 FCCC/SBSTA/20	• Improving mitigation measures can be achieved through defining barriers and constrains at each step of the above mention points. • Cost analysis is sensitive to uncertainty and thus requires	• GHG data • Impact data • Mitigation options • Computer based programs and statistical tools	• Gender building capacity, • Perform awareness programs and training in methodologies, technologies, timing and costs of mitigation measures, • Gender empowerment	Only when it requires

Overall Rank and Score of Prioritized Climate Change Research Topics		CLIMATE CHANGE Topic Prioritized (Policy-oriented *Research* Needed to Address National Gaps)	Article in Conventions/National Policy	Mandate	Provisions / Main Themes	Specific obligation to Jordan in Conventions	National Legislation Gap (as of before developing the cc Policy)	Specific Research Sub-Guidelines	Specific Research Sub-Procedures	Research Tools	Gender Mainstreaming	Synergies
Overall Rank	Score											
		(cost and barriers analyses) at all sectors.			reduce or prevent anthropogenic emissions of GHG not controlled by the Montreal Protocol in all relevant sectors, including the energy, transport, industry, agriculture, forestry and waste management sectors.		MoMRA and MoEnv. Review the newly developed Climate Change Policy of Jordan for details on national needs in this regard.	06/INF.4. • Regional and global climate change impacts associated with different GHG stabilization levels and pathways and their likelihood by region, system and sector; • Develop of new methodologies, technologies, timing and costs of adaptation;	additional reduction through probability analysis. • Cost and barriers analysis might provide a clear vision in the mitigation improvement options. • Use of emission reduction unit "ERU" and certified emission reduction "CER" analysis. • The above mentioned points at technologies and mitigation measures • Costs and benefits analysis • Uncertainties, barriers and constrain analysis. (1) Invention (novel concept or idea, as a result of research, development, and demonstration efforts).		in improving mitigation measures, Costs and benefits analysis, uncertainties, barriers and constrain analysis. • Gender employment in small-scale economically feasible applications, • Gender access to stabilization of GHGs and technologies transfer through workshops. • Women access to perform stabilization of GHGs and technologies transfer research and application for funds through small and large projects.	

Overall Rank and Score of Prioritized Climate Change Research Topics		CLIMATE CHANGE Topic Prioritized (Policy-oriented *Research* Needed to Address National Gaps)	Article in Conventions/National Policy	Mandate	Provisions / Main Themes	Specific obligation to Jordan in Conventions	National Legislation Gap (as of before developing the cc Policy)	Specific Research Sub-Guidelines	Specific Research Sub-Procedures	Research Tools	Gender Mainstreaming	Synergies
Overall Rank	Score											
									(2) Innovation (first market introduction of these ideas). (3) Niche markets (initial, small-scale applications that are economically feasible under specific conditions). • (4) Diffusion (widespread adoption and the evolution into mature markets, ending eventually in decline) • Technological change in no-climate policy scenarios • Technological change in climate policy scenarios • Technological change and the costs of achieving climate targets • Technology needs assessments (TNAs)			
52	62.6	Spatial and temporal	**UNFCCC article**	**Research, Systemati**	• Promote and	Obligated only	Only available at	• Climate variability has a	• Temporal and spatial analogues	• Weather data, sea	•	

Overall Rank and Score of Prioritized Climate Change Research Topics		CLIMATE CHANGE Topic Prioritized (Policy-oriented *Research* Needed to Address National Gaps)	Article in Conventions/National Policy	Mandate	Provisions / Main Themes	Specific obligation to Jordan in Conventions	National Legislation Gap (as of before developing the cc Policy)	Specific Research Sub-Guidelines	Specific Research Sub-Procedures	Research Tools	Gender Mainstreaming	Synergies
Overall Rank	Score											
		analysis for climate variability at local-long period scale.	**5a COP3 COP4 COP15**	**c Observation, Education, Training and Public Awareness.**	cooperate in scientific, technological, technical, socio-economic and other research, systematic observation and development of data archives related to the climate system and intended to further the understanding and to reduce or eliminate the remaining uncertainties regarding the	upon existence of fund	MoEnv and JMD, however, there is no policy or strategy covers this part and needs corporation of the two parties in addition other related ministries at the impact part. Environmental Information Networking needs activation at MoEnv.	general global trend and regional trends that can be estimated or predicted spatially and temporally. This needs the help of Geostatisitcs, time series analysis, and downscaling techniques. • Guidelines on Climate Watches. Geneva: World Meteorological Organization.	and analysis. • The use of probabilities theories. • Climate scenarios and SRES-based climate scenarios	levels, GHGs concentrations, etc. • Computer based software as: JMP, SAS, Geostat, ArchGIS, etc.		

Overall Rank and Score of Prioritized Climate Change Research Topics		CLIMATE CHANGE Topic Prioritized (Policy-oriented *Research* Needed to Address National Gaps)	Article in Conventions/National Policy	Mandate	Provisions / Main Themes	Specific obligation to Jordan in Conventions	National Legislation Gap (as of before developing the cc Policy)	Specific Research Sub-Guidelines	Specific Research Sub-Procedures	Research Tools	Gender Mainstreaming	Synergies
Overall Rank	Score											
					causes, effects, magnitude and timing of climate change and the economic and social consequences of various response strategies. • Support the regional and global observational systems developed under the Global Climate Observing System, the Global Ocean Observing System and the Global Terrestrial Observing							

Overall Rank and Score of Prioritized Climate Change Research Topics		CLIMATE CHANGE Topic Prioritized (Policy-oriented *Research* Needed to Address National Gaps)	Article in Conventions/National Policy	Mandate	Provisions / Main Themes	Specific obligation to Jordan in Conventions	National Legislation Gap (as of before developing the cc Policy)	Specific Research Sub-Guidelines	Specific Research Sub-Procedures	Research Tools	Gender Mainstreaming	Synergies
Overall Rank	Score											
					System, through appropriate funding mechanisms and support national terrestrial networks including observational programmes to collect, exchange and preserve terrestrial data.							
53	61.7	Regional and global climate change impact assessment associated with different GHG stabilization levels and	**UNFCCC article 4c, COP3, COP4, COP13 COP16**	**Commitments / Stabilization of GHGs, Technologies Transfer, and Finance**	Promote and cooperate in the development, application and diffusion, including transfer, of technologies, practices and processes that control, reduce or	Not an obligation (optional)	Some areas were adopted by the MoEnv at NEEDS, however, updates if possible are required at MEMR, MLTD, MIT,	General Guidelines On The Use Of Scenario Data For Climate Impact And Adaptation Assessment, Task Group on Data and Scenario Support for Impact and Climate Assessment	• The stabilization levels require the knowledge of Integrating Information on Impacts and Mitigation Costs, Stabilization of Carbon Dioxide and Other Gases, Description of Concentration Profiles, Other Trace Gas	• Baselines Scenarios • Stabilization Scenarios • Computer based software as: HOMER	• Gender building capacity, • Perform awareness programs and training in climate change impact assessment associated with different GHG stabilization levels,	Synergy with biodiversity through vegetation, in-situ and ex-situ conservation, rehabilitation, sustainable use of components of biological diversity, and biotechnology Synergy with

Overall Rank and Score of Prioritized Climate Change Research Topics		CLIMATE CHANGE Topic Prioritized (Policy-oriented *Research* Needed to Address National Gaps)	Article in Conventions/National Policy	Mandate	Provisions / Main Themes	Specific obligation to Jordan in Conventions	National Legislation Gap (as of before developing the cc Policy)	Specific Research Sub-Guidelines	Specific Research Sub-Procedures	Research Tools	Gender Mainstreaming	Synergies
Overall Rank	Score											
		pathways and their likelihood by region, system and sector.			prevent anthropogenic emissions of GHG not controlled by the Montreal Protocol in all relevant sectors, including the energy, transport, industry, agriculture, forestry and waste management sectors; Create an enabling environment to help further stimulate private-sector investment in, and transfer of, environmentally sound technologies; and know-how to		MoMRA and MoEnv	(TGICA), IPCC, 2007.	Scenarios and Computation of Equivalent CO_2, Temperature and Sea Level Consequences of Stabilizing CO_2 Concentrations, and Impacts and Mitigation Costs Associated with Stabilizing Greenhouse Gases • Mitigation costs of stabilizing CO_2 concentrations include: (a) Future emissions in the absence of policy intervention; (*b*) The concentration target and route to stabilization; (*c*) The behavior of the natural carbon cycle;(*d*) The cost differential between fossil fuels and carbon-free alternatives; (*e*) Technological progress and the rate of adoption of technologies that emit less carbon		• Gender empowerment in all related sectors in association to different GHG stabilization levels and pathways and their likelihood by region, • Gender employment in small-scale economically feasible applications, • Gender participation through workshops. • Women access to perform research and application studies and access funds through small and large projects.	desertification through carbon sequestration, land management, and use of alternative and renewable energy sources

Overall Rank and Score of Prioritized Climate Change Research Topics		CLIMATE CHANGE Topic Prioritized (Policy-oriented *Research* Needed to Address National Gaps)	Article in Conventions/National Policy	Mandate	Provisions / Main Themes	Specific obligation to Jordan in Conventions	National Legislation Gap (as of before developing the cc Policy)	Specific Research Sub-Guidelines	Specific Research Sub-Procedures	Research Tools	Gender Mainstreaming	Synergies
Overall Rank	Score											
					developing countries and to promote the implementation of endogenous know-how.				per unit of energy produced; (*f*) Transitional costs associated with capital stock turnover; (*g*) The degree of international cooperation; and (*h*) Assumptions about the discount rate us.			
54	61.1	Means to enhance innovation in GHG abatement technologies and determinants of the rate of technological change.	**UNFCCC article 4c, COP3, COP4, COP13 COP16**	**Commitments / Stabilization of GHGs, Technologies Transfer, and Finance**	Promote and cooperate in the development, application and diffusion, including transfer, of technologies, practices and processes that control, reduce or prevent anthropogenic emissions	Not an obligation (optional)	Some areas were adopted by the MoEnv at NEEDS, however, updates if possible are required at MEMR, MLTD, MIT, MoMRA and MoEnv	• Innovation including through research and development relating to energy efficiency and savings in the transport and industry sectors; • COP4 Annex to "Practical steps to promote, facilitate and	• Deriving new innovated methods in chemical industry, where chemical products have a twofold effect on GHF emissions for example "CO_2e life cycle analyses" (cLCAs), insulation materials for the construction industry, the use of chemical fertilizer and crop protection in	• GHG emissions data • Mitigation options Computer based programs and statistical tools	• Gender building capacity, • Perform awareness programs and training in research and development relating to energy efficiency, savings in the transport and industry sectors; environmentally sound	Synergy with biodiversity through vegetation, in-situ and ex-situ conservation, rehabilitation, sustainable use of components of biological diversity, and biotechnology Synergy with desertification through carbon

Overall Rank and Score of Prioritized Climate Change Research Topics		CLIMATE CHANGE Topic Prioritized (Policy-oriented *Research* Needed to Address National Gaps)	Article in Conventions/National Policy	Mandate	Provisions / Main Themes	Specific obligation to Jordan in Conventions	National Legislation Gap (as of before developing the cc Policy)	Specific Research Sub-Guidelines	Specific Research Sub-Procedures	Research Tools	Gender Mainstreaming	Synergies
Overall Rank	Score											
					of GHG not controlled by the Montreal Protocol in all relevant sectors, including the energy, transport, industry, agriculture, forestry and waste management sectors.			finance, as appropriate, transfer of, and access to, environmentally sound technologies and know-how"	agriculture, advanced lighting solutions: compact fluorescent lamps (CFLs), with longer lifetimes and greater luminous efficacy than incandescent bulbs, plastic packaging, marine antifouling coatings, synthetic textiles, automotive plastics, low-temperature detergents, engine efficiency, and plastics used in piping. • Energy saving analysis • Product and by product analysis • Baseline and mitigation scenarios • Costs and benefits analysis • Uncertainties, barriers and constrain analysis.		technologies, • Gender empowerment in innovation at GHG abatement technologies. • Gender employment in small-scale economically feasible applications, • Gender access to innovation in GHG abatement technologies through workshops. • Women access to perform innovation in GHG abatement technologies research and application for funds through small and large projects.	sequestration, land management, and use of alternative and renewable energy sources

Overall Rank and Score of Prioritized Climate Change Research Topics		CLIMATE CHANGE Topic Prioritized (Policy-oriented *Research* Needed to Address National Gaps)	Article in Conventions/National Policy	Mandate	Provisions / Main Themes	Specific obligation to Jordan in Conventions	National Legislation Gap (as of before developing the cc Policy)	Specific Research Sub-Guidelines	Specific Research Sub-Procedures	Research Tools	Gender Mainstreaming	Synergies
Overall Rank	Score											
55	59.1	Assessing potential measures to reduce GHG emissions from industrial processes sector.	**UNFCCC article 4b COP13 COP15 COP16**	**Commitments / GHG Mitigation**	Formulate, implement, publish and regularly update national and, where appropriate, regional programmes containing measures to mitigate climate change by addressing anthropogenic emissions by sources and removals by sinks of all GHGs not controlled by the Montreal Protocol Integrity using markets to enhance the cost-effectiveness of, and to promote, mitigation	Not an obligation (optional)	Well established strategies exist at MEMR and laws at MoEnv, however MoA, MoT, and MIT strategies requires further inclusions.	• COP15 "Nationally appropriate mitigation actions of developing country Parties" FCCC/CP/2009/11/Add.1. Review the newly developed Climate Change Policy of Jordan for details on national needs in this regard.	• There are various types of technologies that can play significant roles in mitigating climate change through the knowledge of industrial waste, development trends for industry, and regional emission trends. • GHG emissions from industrial sector can be reduced through waste management and GHG-mitigation technologies, Costs and benefits analysis • Uncertainties, barriers and constrain analysis. • Results of impacts and vulnerability analyses • Global development trends in the industrial sector	• Outputs of GHG inventory • Outputs of CC impacts • CO_2 from waste incineration • Direct and indirect economic impacts • National development goals • Implementation policies • Discount rates • Market efficiency • Transaction and implementation costs	• Gender building capacity, • Perform awareness programs and training in industrial management and GHG-mitigation technologies, • Gender empowerment in mitigation options, Costs and benefits analysis, uncertainties, barriers and constrain analysis. • Gender employment through local communities in waste reduction, re-use and recycling, • Gender access to mitigation through workshops. • Women access to perform	No

Overall Rank and Score of Prioritized Climate Change Research Topics		CLIMATE CHANGE Topic Prioritized (Policy-oriented *Research* Needed to Address National Gaps)	Article in Conventions/National Policy	Mandate	Provisions / Main Themes	Specific obligation to Jordan in Conventions	National Legislation Gap (as of before developing the cc Policy)	Specific Research Sub-Guidelines	Specific Research Sub-Procedures	Research Tools	Gender Mainstreaming	Synergies
Overall Rank	Score											
					actions through stimulating mitigation across broad segments of the economy, safeguarding environmental, and ensuring good governance and robust market functioning and regulation				(production and consumption) • Global and regional emission trends of all GHGs • Industrial management and mitigation costs and potentials		mitigation research and application for funds through small and large projects.	
56	57.8	Improve understanding of the potential implications of different atmospheric concentrations of GHGs.	**UNFCCC article 5a COP3 COP4 COP15**	**Research, Systematic Observation, Education, Training and Public Awareness.**	• Promote and cooperate in scientific, technological, technical, socio-economic and other research, systematic observation and developm	Obligated only upon existence of fund	Only available at MoEnv and JMD, however, there is no policy or strategy covers this part and needs corporation of the two	• Global warming is unequivocal and primarily human-induced, Climate changes are underway in the earth and are projected to grow, and thresholds will be crossed, leading to large changes in climate and	• Implication of different GHGs varies according to type of GHG and its atmospheric concentrations can be studied through: • Quantification of all positive and negative radiative forcing arising from all anthropogenic greenhouse gases	• Same as above • Earth Observing System data as those of NASA as Acrimsat, Aqua, Aquarius, Aura, CloudSat, etc.	• Gender building capacity, • Perform awareness programs and training in potential implications of different atmospheric concentrations of GHGs, and Spatial and temporal analysis for	Only when it requires

Overall Rank and Score of Prioritized Climate Change Research Topics		CLIMATE CHANGE Topic Prioritized (Policy-oriented *Research* Needed to Address National Gaps)	Article in Conventions/National Policy	Mandate	Provisions / Main Themes	Specific obligation to Jordan in Conventions	National Legislation Gap (as of before developing the cc Policy)	Specific Research Sub-Guidelines	Specific Research Sub-Procedures	Research Tools	Gender Mainstreaming	Synergies
Overall Rank	Score											
					ent of data archives related to the climate system and intended to further the understanding and to reduce or eliminate the remaining uncertainties regarding the causes, effects, magnitude and timing of climate change and the economic and social consequences of various response strategies.		parties in addition other related ministries at the impact part. Environmental Information Networking needs activation at MoEnv.	ecosystems. • Temperature and sea level projections depend on the assumed climate sensitivity • Altered patterns of radiative forcing associated with anthropogenic emissions will alter regional climates noticeably, and will have different effects on climate conditions in different regions • Impacts are not a linear function of the magnitude and rate of climate change	and aerosols, and not by the level of CO_2 alone. • The global climate change and the interaction with the natural system can be predicted suing advanced key indicators • Flocculation in surface temperature, sea ice, land ice, sea level, and CO_2 level. • Estimation of climate sensitivity.		climate variability at local-long period scale, • Use of gender-sensitive criteria and indicators to indicate climate variability at local-long period scale, • Women empowerment in temporal and spatial analogues and analysis, • Gender participation through workshops. • Women access to perform research and access funds through small and large projects.	

Overall Rank and Score of Prioritized Climate Change Research Topics		CLIMATE CHANGE Topic Prioritized (Policy-oriented *Research* Needed to Address National Gaps)	Article in Conventions/National Policy	Mandate	Provisions / Main Themes	Specific obligation to Jordan in Conventions	National Legislation Gap (as of before developing the cc Policy)	Specific Research Sub-Guidelines	Specific Research Sub-Procedures	Research Tools	Gender Mainstreaming	Synergies
Overall Rank	Score											
					• Support the regional and global observational systems developed under the Global Climate Observing System, the Global Ocean Observing System and the Global Terrestrial Observing System, through appropriate funding mechanisms and support national terrestrial networks including observational programm							

Overall Rank and Score of Prioritized Climate Change Research Topics		CLIMATE CHANGE Topic Prioritized (Policy-oriented *Research* Needed to Address National Gaps)	Article in Conventions/National Policy	Mandate	Provisions / Main Themes	Specific obligation to Jordan in Conventions	National Legislation Gap (as of before developing the cc Policy)	Specific Research Sub-Guidelines	Specific Research Sub-Procedures	Research Tools	Gender Mainstreaming	Synergies
Overall Rank	Score											
					es to collect, exchange and preserve terrestrial data.							
57	57.4	Enhancement of biomass and carbon sequestration.	**UNFCCC article 4d COP7** CMP.1 COP13 COP15 **COP16**	**Commitments / Sustainable Management**	Promote sustainable management, and promote and cooperate in the conservation and enhancement, as appropriate, of sinks and reservoirs of all greenhouse gases not controlled by the Montreal Protocol, including biomass, forests (afforestation and reforestation) and oceans as well as	Not and obligation (optional)	Some points are included at the Agricultural strategy; however, other points as SOC sequestration are missing and needs further inclusion at the MoA.	• COP13 "Indicative guidance" FCCC/CP/2007/6/Add.1 • COP15 "Methodological guidance for activities relating to reducing emissions from deforestation and forest degradation and the role of conservation, sustainable management of forests and enhancement of forest carbon stocks in developing countries" FCCC/CP/2009/11/Add.1	• Sustainability can be indicated from natural quality for example soil organic carbon content, biomass and forest density as indicators. • Sustainable management requires the knowledge of all systems including soil, biodiversity, and marine environment. • Approaches can be achieved through improving the fertility and environmental conditions for adaptive capacity.Direct and indirect management practice, Baselines	• Results of impacts and vulnerability analyses • SOC, LULC and LULUCF maps. • Same as biodiversity, degradation and agricultural impacts • Vulnerability results • Computer based programs and statistical tools.	• Gender building capacity, • Perform awareness programs and training in sustainable management, and conservation and enhancement of sinks and reservoirs of all GHGs, • Women access to credit, information and carbon fund markets so that they can learn about and decide which resources and technologies can satisfy their needs.	Synergy with biodiversity through vegetation, in-situ and ex-situ conservation, rehabilitation, sustainable use of components of biological diversity, and biotechnology Synergy with desertification through carbon sequestration, land management, and use of alternative and renewable energy sources

Overall Rank and Score of Prioritized Climate Change Research Topics		CLIMATE CHANGE Topic Prioritized (Policy-oriented *Research* Needed to Address National Gaps)	Article in Conventions/National Policy	Mandate	Provisions / Main Themes	Specific obligation to Jordan in Conventions	National Legislation Gap (as of before developing the cc Policy)	Specific Research Sub-Guidelines	Specific Research Sub-Procedures	Research Tools	Gender Mainstreaming	Synergies
Overall Rank	Score											
					other terrestrial, coastal and marine ecosystems. Reduce uncertainty relating to the measurement, estimation, assessment of uncertainties, monitoring and reporting of net carbon stock changes and anthropogenic greenhouse gas emissions by sources and removals by sinks in the land use, land-use change and forestry sector, and provide positive			• COP16 "Guidance and safeguards for policy approaches and positive incentives on issues relating to reducing emissions from deforestation and forest degradation in developing countries; and the role of conservation, sustainable management of forests and enhancement of forest carbon stocks in developing countries" • FCCC/CP/2010/7/Add.1. • Review the newly developed Climate Change Policy of Jordan for details on national needs	scenarios and mitigation scenarios, • Costs and benefits analysis • Uncertainties, barriers and constrain analysis. • Quality assurance/quality control (QA/QC) analysis		• Gender empowerment in sustainable management options, Costs and benefits analysis, uncertainties, barriers and constrain analysis. • Gender employment through local communities in biomass, forests (afforestation and reforestation) and oceans as well as other terrestrial, coastal and marine ecosystems. • Gender participation through workshops. • Women access to perform research and application studies in	

Overall Rank and Score of Prioritized Climate Change Research Topics		CLIMATE CHANGE Topic Prioritized (Policy-oriented *Research* Needed to Address National Gaps)	Article in Conventions/National Policy	Mandate	Provisions / Main Themes	Specific obligation to Jordan in Conventions	National Legislation Gap (as of before developing the cc Policy)	Specific Research Sub-Guidelines	Specific Research Sub-Procedures	Research Tools	Gender Mainstreaming	Synergies
Overall Rank	Score											
					incentives on issues relating to reducing emissions from deforestation and forest degradation			in this regard.			sustainable management and access funds through small and large projects.	
58	56.8	Uncertainty analysis for GHG inventory.	**UNFCCC articles 4, 5 COP3 COP4 COP15**	**Research, Systematic Observation, Education, Training and Public Awareness.**	• Promote and cooperate in scientific, technological, technical, socio-economic and other research, systematic observation and development of data archives related to the climate system and intended	Obligated only upon existence of fund	Only available at MoEnv and JMD, however, there is no policy or strategy covers this part and needs corporation of the two parties in addition other related ministries at the impact	• Uncertainty analysis includes (i) Determining uncertainties in individual variables used in the inventory (e.g., estimates of emissions from specific categories, emission factors, activity data); (ii) Aggregating the component uncertainties to the total inventory; (iii) Determining the uncertainty in the trend; and (iv)	• Reducing uncertainty can be achieved through: (1) Improving conceptualization, (2) Improving models, (3) Improving representativeness, (4) Using more precise measurement methods, (5) Collecting more measured data, (6) Eliminating known risk of bias, and (7) Improving state of knowledge	• Statistical analyses including (Accuracy, Bias, Confidence Interval, Precision:, Probability density function (PDF), Random errors, Systematic error, Uncertainty, and Variability) • Advance statistical software	• Perform training programs, • Women empowerment in uncertainty analysis, • Gender participation through workshops. • Women access to perform research and access funds through small and large projects.	Only when it requires

Overall Rank and Score of Prioritized Climate Change Research Topics		CLIMATE CHANGE Topic Prioritized (Policy-oriented *Research* Needed to Address National Gaps)	Article in Conventions/National Policy	Mandate	Provisions / Main Themes	Specific obligation to Jordan in Conventions	National Legislation Gap (as of before developing the cc Policy)	Specific Research Sub-Guidelines	Specific Research Sub-Procedures	Research Tools	Gender Mainstreaming	Synergies
Overall Rank	Score											
					to further the understanding and to reduce or eliminate the remaining uncertainties regarding the causes, effects, magnitude and timing of climate change and the economic and social consequences of various response strategies. • Support the regional and global observational systems developed		part. Environmental Information Networking needs activation at MoEnv.	Identifying significant sources of uncertainty in the inventory to help prioritise data collection and efforts to improve the inventory. • IPCC Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories • FCCC/CP/1998/16/Add.1 •				

Overall Rank and Score of Prioritized Climate Change Research Topics		CLIMATE CHANGE Topic Prioritized (Policy-oriented *Research* Needed to Address National Gaps)	Article in Conventions/National Policy	Mandate	Provisions / Main Themes	Specific obligation to Jordan in Conventions	National Legislation Gap (as of before developing the cc Policy)	Specific Research Sub-Guidelines	Specific Research Sub-Procedures	Research Tools	Gender Mainstreaming	Synergies
Overall Rank	Score											
					under the Global Climate Observing System, the Global Ocean Observing System and the Global Terrestrial Observing System, through appropriate funding mechanisms and support national terrestrial networks including observational programmes to collect, exchange and preserve terrestrial data.							

Overall Rank and Score of Prioritized Climate Change Research Topics		CLIMATE CHANGE Topic Prioritized (Policy-oriented *Research* Needed to Address National Gaps)	Article in Conventions/National Policy	Mandate	Provisions / Main Themes	Specific obligation to Jordan in Conventions	National Legislation Gap (as of before developing the cc Policy)	Specific Research Sub-Guidelines	Specific Research Sub-Procedures	Research Tools	Gender Mainstreaming	Synergies
Overall Rank	Score											
59	56.0	Assessing the most feasible cross-cutting policy instruments for climate change mitigation in Jordan such as Regulatory/command-and-control; market mechanisms; financial incentives/grants; fiscal incentives; taxation; voluntary agreements; information and awareness/knowledge transfer.	**UNFCCC article 4b**	**Commitments / GHG Mitigation**	Formulate, implement, publish and regularly update national and, where appropriate, regional programmes containing measures to mitigate climate change by addressing anthropogenic emissions by sources and removals by sinks of all GHGs not controlled by the Montreal Protocol Integrity using markets to enhance the cost-effectiveness of, and to promote, mitigation	Not an obligation (optional)	Well established strategies exist at MEMR and laws at MoEnv, however MoA, MoT, and MIT strategies requires further inclusions.	• COP15 "Nationally appropriate mitigation actions of developing country Parties" FCCC/CP/2009/11/Add.1. • Review the newly developed Climate Change Policy of Jordan for details on national needs in this regard.	• Fiscal and tax policies can encourage the early introduction of new technologies. The conversion efficiency of electric power plants can be raised. Power-plant emissions can also be reduced by switching to renewable sources. • Statistical and cost effective analyses, • Costs and benefits analysis • Uncertainties, barriers and constrain analysis. • Results of impacts and vulnerability analyses • Discount rates • Market efficiency • Transaction and implementation costs	• GHG inventory results • Impact and vulnerability results,	• Gender building capacity, • Perform awareness programs and training in GHG-mitigation in energy utilization efficiency, • Gender empowerment in mitigation options, Costs and benefits analysis, uncertainties, barriers and constrain analysis. • Gender access to mitigation through workshops. • Women access to perform mitigation research and application for funds through small and large projects.	No

Overall Rank and Score of Prioritized Climate Change Research Topics		CLIMATE CHANGE Topic Prioritized (Policy-oriented *Research* Needed to Address National Gaps)	Article in Conventions/National Policy	Mandate	Provisions / Main Themes	Specific obligation to Jordan in Conventions	National Legislation Gap (as of before developing the cc Policy)	Specific Research Sub-Guidelines	Specific Research Sub-Procedures	Research Tools	Gender Mainstreaming	Synergies
Overall Rank	Score											
					actions through stimulating mitigation across broad segments of the economy, safeguarding environmental, and ensuring good governance and robust market functioning and regulation							
60	55.7	Improving observations, monitoring, and understanding of radiation forcing, processes and coupling.	**UNFCCC article 5a COP3 COP4 COP15**	**Research, Systematic Observation, Education, Training and Public Awareness.**	• Promote and cooperate in scientific, technological, technical, socio-economic and other research, systematic observation and developm	Obligated only upon existence of fund	Only available at MoEnv and JMD, however, there is no policy or strategy covers this part and needs corporation of the two	• UNFCCC reporting guidelines on global climate change observing systems • FCCC/CP/1999/7 • FCCC/CP/1998/16/Add.1 • Guidelines on Climate Watches. Geneva: World	• Estimation of both climate and non-climate drivers affect systems. Non-climate drivers such as urbanization and pollution can influence systems directly and indirectly through their effects on climate variables such as albedo and soil-moisture regimes. Socio-	• Data of temperature and precipitation, Snow cover, Runoff/Stream flow, Floods, Droughts, Water Temperature and chemistry, Groundwater, etc.	• Gender building capacity, • Perform awareness programs and training in observations, monitoring, and understanding of radiation forcing, processes and coupling, • , • Gender	No

Overall Rank and Score of Prioritized Climate Change Research Topics		CLIMATE CHANGE Topic Prioritized (Policy-oriented *Research* Needed to Address National Gaps)	Article in Conventions/National Policy	Mandate	Provisions / Main Themes	Specific obligation to Jordan in Conventions	National Legislation Gap (as of before developing the cc Policy)	Specific Research Sub-Guidelines	Specific Research Sub-Procedures	Research Tools	Gender Mainstreaming	Synergies
Overall Rank	Score											
					ent of data archives related to the climate system and intended to further the understanding and to reduce or eliminate the remaining uncertainties regarding the causes, effects, magnitude and timing of climate change and the economic and social consequences of various response strategies.		parties in addition other related ministries at the impact part. Environmental Information Networking needs activation at MoEnv.	Meteorological Organization.	economic processes, including land-use change (e.g., forestry to agriculture; agriculture to urban area) and land-cover modification (e.g., ecosystem degradation or restoration) also affect multiple systems. • Climate drivers including the cryosphere, hydrology and water resources, marine and freshwater biological systems, terrestrial biological systems, agriculture and forestry. • Non-climate drivers of change including land use, land degradation, urbanization and pollution, affect systems directly and indirectly	• Dramatic changes in the distribution of plants and animals • Large-scale climate variations, such as the Pacific Decadal Oscillation (PDO), El Nino-Southern Oscillation (ENSO) and North Atlantic Oscillation (NAO), GCOS), GCOS, GUAN, GTN-G, GTN-P, and FLUXNET. • The socio-economic processes that drive land-use change include	participation through workshops. • Women access to perform research and access funds through small and large projects.	

Overall Rank and Score of Prioritized Climate Change Research Topics		CLIMATE CHANGE Topic Prioritized (Policy-oriented *Research* Needed to Address National Gaps)	Article in Conventions/National Policy	Mandate	Provisions / Main Themes	Specific obligation to Jordan in Conventions	National Legislation Gap (as of before developing the cc Policy)	Specific Research Sub-Guidelines	Specific Research Sub-Procedures	Research Tools	Gender Mainstreaming	Synergies
Overall Rank	Score											
					• Support the regional and global observational systems developed under the Global Climate Observing System, the Global Ocean Observing System and the Global Terrestrial Observing System, through appropriate funding mechanisms and support national terrestrial networks including observational programm				through their effects on climate. • Trend analysis using regression, correlation and time-series analyses • Sensitivity analysis model-based CCIAV • Systematic observation for meteorological, atmospheric, oceanographic and terrestrial observations of the climate system as identified by the Global Climate Observing System (GCOS), Surface Network GCOS, Upper Air Network (GUAN), Global Terrestrial Network - Glaciers (GTN-G), Global Terrestrial Network - Permafrost (GTN-P), and the Global Terrestrial Network – Carbon	population growth, economic development, trade and migration		

Overall Rank and Score of Prioritized Climate Change Research Topics		CLIMATE CHANGE Topic Prioritized (Policy-oriented *Research* Needed to Address National Gaps)	Article in Conventions/National Policy	Mandate	Provisions / Main Themes	Specific obligation to Jordan in Conventions	National Legislation Gap (as of before developing the cc Policy)	Specific Research Sub-Guidelines	Specific Research Sub-Procedures	Research Tools	Gender Mainstreaming	Synergies
Overall Rank	Score											
					es to collect, exchange and preserve terrestrial data.				(FLUXNET).			
61	54.8	Carbon capture and storage (CCS) and sustainable management, and enhancement of sinks and reservoirs of all GHGs.	**UNFCCC article 4d COP7** CMP.1 COP13 COP15 **COP16**	**Commitments / Sustainable Management**	Promote sustainable management, and promote and cooperate in the conservation and enhancement, as appropriate, of sinks and reservoirs of all greenhouse gases not controlled by the Montreal Protocol, including biomass, forests (afforestation and reforestation) and oceans as well as	Not and obligation (optional)	Some points are included at the Agricultural strategy; however, other points as SOC sequestration are missing and needs further inclusion at the MoA.	• COP13 "Indicative guidance" FCCC/CP/2007/6/Add.1 • COP15 "Methodological guidance for activities relating to reducing emissions from deforestation and forest degradation and the role of conservation, sustainable management of forests and enhancement of forest carbon stocks in developing countries" FCCC/CP/2009/11/Add.1	• Sustainability can be indicated from natural quality for example soil organic carbon content, biomass and forest density as indicators. • Sustainable management requires the knowledge of all systems including soil, biodiversity, and marine environment. • Approaches can be achieved through improving the fertility and environmental conditions for adaptive capacity.Direct and indirect management practice, Baselines	• Results of impacts and vulnerability analyses • SOC, LULC and LULUCF maps. • Same as biodiversity, degradation and agricultural impacts • Vulnerability results • Computer based programs and statistical tools.	• Gender building capacity, • Perform awareness programs and training in sustainable management, and conservation and enhancement of sinks and reservoirs of all GHGs, • Women access to credit, information and carbon fund markets so that they can learn about and decide which resources and technologies can satisfy their needs.	Synergy with biodiversity through vegetation, in-situ and ex-situ conservation, rehabilitation, sustainable use of components of biological diversity, and biotechnology Synergy with desertification through carbon sequestration, land management, and use of alternative and renewable energy sources

Overall Rank and Score of Prioritized Climate Change Research Topics		CLIMATE CHANGE Topic Prioritized (Policy-oriented *Research* Needed to Address National Gaps)	Article in Conventions/National Policy	Mandate	Provisions / Main Themes	Specific obligation to Jordan in Conventions	National Legislation Gap (as of before developing the cc Policy)	Specific Research Sub-Guidelines	Specific Research Sub-Procedures	Research Tools	Gender Mainstreaming	Synergies
Overall Rank	Score											
					other terrestrial, coastal and marine ecosystems. Reduce uncertainty relating to the measurement, estimation, assessment of uncertainties, monitoring and reporting of net carbon stock changes and anthropogenic greenhouse gas emissions by sources and removals by sinks in the land use, land-use change and forestry sector, and provide positive			• COP16 "Guidance and safeguards for policy approaches and positive incentives on issues relating to reducing emissions from deforestation and forest degradation in developing countries; and the role of conservation, sustainable management of forests and enhancement of forest carbon stocks in developing countries" . • Review the newly developed Climate Change Policy of Jordan for details on national needs in this regard.	scenarios and mitigation scenarios, • Costs and benefits analysis • Uncertainties, barriers and constrain analysis. • Quality assurance/quality control (QA/QC) analysis		• Gender empowerment in sustainable management options, Costs and benefits analysis, uncertainties, barriers and constrain analysis. • Gender employment through local communities in biomass, forests (afforestation and reforestation) and oceans as well as other terrestrial, coastal and marine ecosystems. • Gender participation through workshops. • Women access to perform research and application studies in	

Overall Rank and Score of Prioritized Climate Change Research Topics		CLIMATE CHANGE Topic Prioritized (Policy-oriented *Research* Needed to Address National Gaps)	Article in Conventions/National Policy	Mandate	Provisions / Main Themes	Specific obligation to Jordan in Conventions	National Legislation Gap (as of before developing the cc Policy)	Specific Research Sub-Guidelines	Specific Research Sub-Procedures	Research Tools	Gender Mainstreaming	Synergies
Overall Rank	Score											
					incentives on issues relating to reducing emissions from deforestation and forest degradation						sustainable management and access funds through small and large projects.	

2.4.2. Summary of desertification research priorities, guidelines, procedures and tools

Different research guidelines, procedures and tools can be used to support the implementation of policy-oriented research in the area of combating desertification (Table 8). The different UNCCD COP and CST sessions focused on the use of different tools for drought monitoring and for early warning systems. Among these tools are the biophysical ones which are usually implemented for mapping the potential for soil erosion by wind and water. Other models are based on remote sensing data and are usually applied to assess droughts and vegetation conditions. Examples on some of these models are shown in Annex 2. The UNCCD and COPs emphasized the roles of economic models for decision making. Also, the use and establishment of national, regional and international networks shall be considered by researchers when submitting proposals for financing. Therefore, the policy-oriented research in the area of desertification can be categorized under the following groups:

1. Desertification models.

Different models have been developed by international research communities and organizations. These include soil erosion models, remote sensing and GIS models for mapping desertification and droughts, models for drought monitoring and assessment, climate change models and their downscaled versions.

2. Desertification databases.

A huge list of databases on desertification is available on the website. The most important databases are those hosted by FAO, ISRIC and UNEP. These databases can be used to generate maps of desertification at global scales. Currently, global databases are expanding and including many data sources and information. The daily regional and global data of remote sensing is also operational since year 2001. These free datasets, part of the NASA program, are available through the web (https://reverb.echo.nasa.gov, previously through https://wist-ops.echo.nasa.gov). The data include remote sensing indices of vegetation, surface albedo, brightness temperature and many invaluable parameters for desertification research.

The SD-DIMENSIONS database is another important database, which was established by FAO (http://www.fao.org/waicent/faoinfo/sustdev/Welcome_.htm) to provide source of information on desertification data. A list of web resources for desertification is available through the website of University of Arizona (http://ag.arizona.edu/oals/ALN/aln40/WebResources.html) and the International Arid Land Consortium (ALIC) (http://ialcworld.org/), which used to be an important source of fund for research projects in Jordan. A website on land management and soils of Jordan, supported by ALIC, is currently available at (http://alic.arid.arizona.edu/jordansoils/).

3. Global data networks.

There are many networks for global, regional and sub-regional datasets that can be accessed by researchers to exchange information and data needed for modelling and assessment of desertification. Among these networks are:

a- The CSO Network to Combat Desertification (http://unccdcso.blogspot.com/), which was established in accordance to COP10.

b- The CEO Desertification Information Network which is under establishment by the European Community, as part of the CEO (Centre for Earth Observation) programme. This network is focusing on Africa and the Mediterranean basin. (https://directory.eoportal.org/get_announce.php?an_id=5380).

A list of networks is available at http://ag.arizona.edu/oals/ALN/aln40/WebResources.html.

4. Awareness campaigns and meetings.

These tools are important for enhancing public participation, exchanging of data and results, dissemination of results and increasing public awareness. These tools shall be considered by researchers when submitting proposals for funding. The end users of the proposed projects shall be also identified and the communication means shall be set at the start of research projects.

TABLE 8: SUMMARY OF DESERTIFICATION RESEARCH PRIORITIES, GUIDELINES, PROCEDURES AND TOOLS

Overall Rank and Score of Prioritized Desertification Research Topics		DESERTIFICATION Topic Prioritized (Policy-oriented *Research* Needed to Address National Gaps)	Article	Mandate	Provisions/main themes	Specific obligation(s) to Jordan	National Legislation Gap	Specific Research Sub-Guidelines	Specific Research Sub-Procedures	Research Tools	Gender Mainstreaming	Synergies
Overall Rank	Score											
1	88	Water Management and its roles in combating desertification	**UNCCD-Article 17** *COP2/CST2* *COP3/CST 3*	Research and development	Water resources development.	Integrate desertification in the strategies of MWI and MOA	Lack of resource mobilization in the regulations of Environment Protection Fund for policy-oriented research in the areas of Rio Conventions.	• Review MWI water strategy. • Consult program 5 of NAP. • Refer to IFS output 4.3. • Review CDM and regulations of Environment Protection Fund.	• Prepare proposals with TRG and NCCD. • Include climate change threats. • Include CDM projects.	• Ground surveys. • Remote sensing and GIS. • Analogue models. • Databases and networks.	• Empower gender in the area of water management and reuse. • Identify gender aspects of the technology and the need to upgrade woman knowledge in water management	Assessment of climate change impacts on water scarcity and security while considering spatial and temporal variability.
2	85	Soil Conservation measures to combat desertification	**UNCCD-Article 17** *COP2/CST2* *COP3/CST 3*	Research and development	Promoting, adopting and enhancing transfer of technology relevant to combating desertification.	Conduct joint programmes in the fields of research, training and systematic observation and information collection.	Lack of SLM in the strategies of MOMA, MOE, MWI and Youth. Emphasis of technology transfer for combating desertification in the strategy of MOA and NCARE.	• Review Reports of previous studies and research in Jordan (BRDC, UOJ-JAZZP, and NCARE). • Review Programs 3 and 5 of NAP.	• Work with the three TRG at MoEnv to prepare proposals. • Consider GEF and environment protection fund.	• Ground surveys. • Remote sensing and GIS. • Analogue models.	• Empower gender in the area of land management	Link soil conservation measures with carbon sequestration and biodiversity conservation.
3	84	Drought Mitigation	**UNCCD-Article 5**	Obligations of affected Parties	Mitigate the effects of drought.	Drought mitigation programs	Need to upgrade drought strategy and its mandate.	• Review CST reports and identify measurable biophysical and socioeconomic parameters for	• Consider financial resources and levels of financial support. • Decide on	• House hold surveys • Documented traditional knowledge • Climatic data • Economic	• Consider woman access to fund resources for projects aiming at drought	Climate change projections with most appropriate lead times and

Overall Rank and Score of Prioritized Desertification Research Topics		DESERTIFICATION Topic Prioritized (Policy-oriented *Research* Needed to Address National Gaps)	Article	Mandate	Provisions/main themes	Specific obligation(s) to Jordan	National Legislation Gap	Specific Research Sub-Guidelines	Specific Research Sub-Procedures	Research Tools	Gender Mainstreaming	Synergies
Overall Rank	Score											
								drought assessment. • Review the National Strategy and Action Plan for Drought Mitigation. • Identify research needs to identify requirements and/or gaps.	geographical extent. • Include drought monitoring centre at NCARE as part of the team. • Submit proposal through MoEnv.	models	mitigation. • Include training programs for drought mitigation in the research proposal.	focus on extreme events such as drought, considering the possibility of external forcing
4	83	Community Participation and Public awareness (Holistic Management Approach)	**UNCCD-Article 5**	Obligations of affected Parties	• Promotion of awareness. • Facilitate the participation of local populations, particularly women and youth.	• Enabling a suitable environment for full participation. • Empowering the roles of women and youth. • Drought assessment and Mitigation.	Need to upgrade MOMA and Youth strategies to include awareness on SLM.	• Consult UNCCD national reports. • Consult programs 1, 5 and 6of NAP and output 1.4 of IFS. • Focus of the Advocacy Policy Framework (APF) on Gender ICCD/CRIC(10)/20)	• Prepare joint proposals with line ministries and NGOs. • Include target groups and beneficiaries in the proposal. • Link proposal with development plans and strategies. • Consider USAID and UNESCO as funding resource.	• Mass media and web • Awareness campaigns • National and regional networks	Include a research plan that emphasize the roles of woman and youth as part of the research in the area of combating desertification	Conserving biodiversity as a result of combating desertification
5	82	Training and capacity building for combating desertification	**UNCCD-Article 8** *COP5/CST5*	Rio conventions	Conduct joint programmes in the fields of research, training and systematic	• Encouragement of coordination • Prioritize research related to	Lack of the synergy among Rio Conventions in the strategies of MOA and	• Review program 3 of NAP and output 4.3 of IFS. • Review the documents of the CST,	• Consider international financial resources and Environment Protection	• GCMs and statistical downscaling • GIS tools and remote sensing data • Training	• Include training component for woman in the research proposal. • Empower	Training needs and harmony between combating desertification and

Overall Rank and Score of Prioritized Desertification Research Topics		DESERTIFICATION Topic Prioritized (Policy-oriented *Research* Needed to Address National Gaps)	Article	Mandate	Provisions/main themes	Specific obligation(s) to Jordan	National Legislation Gap	Specific Research Sub-Guidelines	Specific Research Sub-Procedures	Research Tools	Gender Mainstreaming	Synergies
Overall Rank	Score											
					observation and information collection.	Rio conventions. • Design and launch of monitoring systems for DLDD.	MoEnv.	particularly the first scientific conference. • Consult international literature on links among Rio conventions.	Fund. • Include issues of carbon sequestration in the proposal. • Include well identified protocols for data collection and analysis.	programs and workshops	woman in the fields of Rio Conventions and DLDD through workshops and local associations	mitigating climate change.
6	81	Livelihood and rural poverty links to desertification (Holistic Management Approach)	**UNCCD-Article 4**	General obligations	Integration of strategies for poverty eradication.	Integration of desertification with other strategies	Need to upgrade strategy of MOSD to link sustainable livelihood and resource management with poverty eradication	Link rural poverty to desertification and propose creation of viable rural livelihoods that do not depend solely on agricultural activities.	Consult MOSD and MoEnv for proposal preparation. Submit proposals for external fund resources.	• MOSD studies and reports • DOS data and reports • Ground surveys • Economic models.	Promote women's equal access to land ownership and other resources needed for effective socio-economic participation, such as capital, technical assistance, technology, tools, equipment, markets and time.	• Linking DLDD to loss of biodiversity and ecosystem functions • Assessment of socio-economic impacts with broad focus including all sectors.
• 7	• 80	• Drought and desertification (Internal feedback mechanism). • Impact of land use changes and management on desertification	**UNCCD-Article 7**	Priority for Africa	• Strengthening subregional, regional and international cooperat	Cooperation among affected parties for monitoring and assessment of desertificatio	Lack of the regional cooperation in the area of desertification monitoring in the strategy of MOPIC.	• Consider internal feedback mechanism as the cause of desertification. • Consider trans-boundary issues and the impacts	• Seek for regional and international partners. • Consider the use of GCMs and global datasets. • Consider	• Remote sensing data and GIS tools • Climatic data • Hydrological models • Regional and international networks	Consider gender training and empowerment in the areas of remote sensing, GIS and modelling tools.	Link with climate change using the internal feedback mechanism and the external

Overall Rank and Score of Prioritized Desertification Research Topics		DESERTIFICATION Topic Prioritized (Policy-oriented *Research* Needed to Address National Gaps)	Article	Mandate	Provisions/main themes	Specific obligation(s) to Jordan	National Legislation Gap	Specific Research Sub-Guidelines	Specific Research Sub-Procedures	Research Tools	Gender Mainstreaming	Synergies
Overall Rank	Score											
		and climate change			ion. • Assessment of trans-boundary impacts of the problem including impacts of desertification in Sahel.	n.		of desertification of Sahel on dust storms and desertification in Jordan. • Link desertification and trans-boundary water problems.	international financial resources.			forcing
8	76	Creation of suitable databases and selection of suitable monitoring tools.	**UNCCD-Article 8** **UNCCD-Article 16** *COP5/CST5*	Rio conventions Information collection, analysis and exchange	• Monitoring and assessment of drought and desertification • Early warning systems. • Exchange of information through global networks and dissemination of technology. • Support to programmes of data collection and	• Implementing the NAP programs for drought mitigation and early warning systems. • Cooperation with regional networks. • Protocols for data collection, analysis and exchange.	• Lack of a legal framework for data exchange among research institutions and other governmental institutions. • Identified protocols for data collection and sharing through MoEnv focal points of Rio Conventions	• Review COP5/CST5 to finalize objectives with international dimensions. • Review program 1 of NAP. • Review UNCCD implementation reports and CST recommendations. • Select suitable biophysical parameters that can be measured, monitored, exchanged and applied in similar environments. • Consider trans-boundary problems of	• Build on international experience. • Include drought monitoring centre at NCARE as part of the team. • Prepare proposals to include protocols for data exchange. • Identify benefits and limits for data sharing. • Consider a multidisciplinary team. • Submit proposal through	• Remote sensing data (albedo, moisture, LAI, Vegetation indices). • Climatic data • General models of desertification. • GIS tools • DOS data	Setup plans for training woman on the creation and use of databases as well as in monitoring of desertification	Link with climate change using the internal feedback mechanism and the external forcing. and consider spatial and temporal analysis of climate variability

Overall Rank and Score of Prioritized Desertification Research Topics		DESERTIFICATION Topic Prioritized (Policy-oriented *Research* Needed to Address National Gaps)	Article	Mandate	Provisions/main themes	Specific obligation(s) to Jordan	National Legislation Gap	Specific Research Sub-Guidelines	Specific Research Sub-Procedures	Research Tools	Gender Mainstreaming	Synergies
Overall Rank	Score											
					analysis			desertification.	MoEnv.			
9	76	Indigenous knowledge and its roles in combating desertification (Holistic Management Approach)	**UNCCD-Article 17** *COP2/CST2* *COP3/CST 3*	Research and development	• Increased knowledge on causes and impacts of desertification. • Enhancement and validation of traditional and local knowledge.	Empowering research to combat desertification.	Lack of resource mobilization in the regulations of Environment Protection Fund for policy-oriented research in the areas of Rio Conventions.	• Review COPs 2 & 3 and implementation reports. • Review causes of DLDD reported in NAP and BRP roadmap. • Refer to IFS outputs 1.3 and 1.4.	• Prepare proposals jointly with TRG and NCCD. • Emphasize CBA in the proposal. • Work with MoEnv to attract fund through GM, GEF and WB sources of fund.	• DOS data. • Ground surveys. • Networks and databases.	• Include ground surveys to document traditional and indigenous knowledge in the area of combating desertification • Validate traditional knowledge and transfer to woman through workshops and training programs	Link between drought mitigation and adaptation to climate change based on indigenous knowledge
10	75	Linkages among land degradation processes	COP/CST 8 /CRIC 6 CRIC 7/CST-S1 COP/CST 9 /CRIC 8 COP/CST 10 /CRIC 10	UNCCD 10-year Strategy (2008-2018)	Options for enhanced cooperation among the Rio Conventions.	• Identification of root causes of land degradation. • Identification of rehabilitation path.	Lack of the policy-oriented research in the area of combating desertification in NAP and in the strategies of HCST.	• Consider CST messages and recommendations of its scientific conference on research needs on DLDD and synergies.	• Review BRP roadmap and program 4 of NAP. • Consult output 1.4 of the IFS. • Consult CAP of BRP for packages of interventions.	• Vegetation and soil databases. • Socioeconomic databases and DOS reports.	Emphasize the gender inequality as a major cause of land degradation in rural areas.	• Carbon sequestration and improvement of ecosystem functions and their link to mitigation for climate change • SLM as the key for rehabilitation of degraded lands
11	74	Indicators of desertification	COP6/CST6 /CRIC2	Modalities and possible	Land degradation	Following recommenda	N/A	• Review of UNCCD implementation	• Obtain feedback	• Soil database (JOSCIS) and	Consider gender involvement in	Link with climate

Overall Rank and Score of Prioritized Desertification Research Topics		DESERTIFICATION Topic Prioritized (Policy-oriented *Research* Needed to Address National Gaps)	Article	Mandate	Provisions/main themes	Specific obligation(s) to Jordan	National Legislation Gap	Specific Research Sub-Guidelines	Specific Research Sub-Procedures	Research Tools	Gender Mainstreaming	Synergies
Overall Rank	Score											
			CRIC 3 CST S-2/CRIC9	TOR for regional coordination unit.	assessment (LADA) and the Millennium Ecosystem Assessment (MEA).	tions of CST on desertification indicators		reports to select indicators for desertification • Consult international literature on the findings of research in similar environments to Jordan.	from TRG and NCCD • Merge the theme of mapping with benchmark indicators for implementation • Consider national fund resources	climatic data. • Remote Sensing and GIS. • DUST_EM and USLE. • Apply general models of desertification for assessment.	data collection and analysis.	change using the internal feedback mechanism and the external forcing
12	73	Contemporary tools for mapping desertification	COP6/CST6/CRIC2 CRIC 3 CST S-2/CRIC9	Modalities and possible TOR for regional coordination unit.	Land degradation assessment (LADA) and the Millennium Ecosystem Assessment (MEA).	Following recommendations of CST on desertification indicators	N/A	• Consult international literature on the findings of research in similar environments to Jordan. • Consult Program 1 of NAP	• Obtain feedback from TRG and NCCD • Merge the theme of mapping with benchmark indicators for implementation • Consider national fund resources	• Remote Sensing and GIS. • DUST_EM and USLE.	Consider gender training and empowerment in the areas of remote sensing, GIS and modelling tools.	Link with climate change using the internal feedback mechanism and the external forcing
13	72	Link between climate change and desertification.	COP/CST 8/CRIC 6 CRIC 7/CST-S1 COP/CST 9/CRIC 8 COP/CST 10/CRIC 10	UNCCD 10-year Strategy (2008-2018)	• The effects of climatic variations and human activities on land degradation.	Cooperation among affected parties for monitoring and assessment of desertification.	Climate Change policy	• Consider the link between climate change and desertification. • Consider trans-boundary issues and the impacts of desertification of Sahel on dust storms and desertification in Jordan.	• Seek for regional and international partners. • Consider the use of GCMs and global datasets. • Consider international financial resources.	• Remote sensing data and GIS tools • Climatic data • Hydrological models Regional and international networks	• Consider gender training and empowerment in the areas of remote sensing, GIS and modelling tools.	Link with climate change using the external forcing theory

Overall Rank and Score of Prioritized Desertification Research Topics		DESERTIFICATION Topic Prioritized (Policy-oriented *Research* Needed to Address National Gaps)	Article	Mandate	Provisions/main themes	Specific obligation(s) to Jordan	National Legislation Gap	Specific Research Sub-Guidelines	Specific Research Sub-Procedures	Research Tools	Gender Mainstreaming	Synergies
Overall Rank	Score											
								• Link desertification and trans-boundary water problems.				
14	70	Institutional mechanism for combating desertification	**UNCCD-Article 3**	Principles	• Community-based participation. Involvement and cooperation of all stakeholders at all levels.	Enabling a suitable environment for full participation.	Need to upgrade strategies of MOA, MOMA and MOSD to strengthen participation.	• Identify institutional and political settings needed to combat desertification and to enable public participation. Merge feedback from NCCD and TRG	• Consult BRP road map. • Consult program 3 of NAP and output 1.2 of IFS. • Consider USAID, EU and UNESCO for funding.	• Analogue models • Awareness campaigns • Workshops and meetings	Include a research plan that emphasize the roles of woman as part of the research in the area of institutional mechanism	Conserving biodiversity as a result of combating desertification
15	69	Benchmarks and indictors for implementing UNCCD and NAP for combating desertification	**UNCCD-Article 10**	National Action programmes (NAPs)	• Strategies to combat desertification. • Preventive measures for non-degraded lands. • Drought early warning systems. • Policies towards implementation. • Feedback and regular reviews of NAP. Income generation projects.	Implementation of country's NAP (NSAPCD).	1- Lack of policy-oriented research in the area of combating desertification in NAP. 2- Lack of the early warning systems from the National Strategy and Action Plan for Drought Mitigation.	• Review NAP programs. • Review the IFS and its suggested actions. • Consult the focal point at MoEnv. • Review national implementation reports of years 2000, 2002, 2007 and 2011. • Review PRAIS system. • Review CST recommendations on benchmarks and indicators. •	• Identify methods for monitoring and evaluation of NAP implementation. • Stratify methods according to program. • Identify and form a multidisciplinary team including line ministries. • Consult MoEnv, NCCD and TRG for possible financial	• Will differ according to program and projects of NAP. However, contemporary tools for biophysical indicators and economic tools for socioeconomic dimensions shall be included.	• Setup plans to empower woman in the area of combating desertification Consider woman access to fund resources for income generation projects	Link with climate change and biodiversity conservation through projects that sequestrate soil carbon.

Overall Rank and Score of Prioritized Desertification Research Topics		DESERTIFICATION Topic Prioritized (Policy-oriented *Research* Needed to Address National Gaps)	Article	Mandate	Provisions/main themes	Specific obligation(s) to Jordan	National Legislation Gap	Specific Research Sub-Guidelines	Specific Research Sub-Procedures	Research Tools	Gender Mainstreaming	Synergies
Overall Rank	Score											
									resources.			
16	67	Use of non-equilibrium models for rangeland restoration (community-based approach)	**UNCCD-Article 17** *CST -S1* CRIC 1	Reviewing reports of UNCCD	Measures for the rehabilitation of degraded land and for early warning systems.	Orientation of development programs towards rehabilitation of degraded rangelands	Upgrade of rangeland strategy to include related programs and objectives.	• Review BRP roadmap and program 4 of NAP. • Consult output 1.4 of the IFS. Consult CAP of BRP for packages of interventions.	• Prepare proposals jointly with MOA, NCARE and MoEnv. Consider GEF, UNDP, IDRC and BRP as sources of fund.	• Databases of socioeconomic and biophysical factors. • Remote sensing and GIS tools. • Rapid rural appraisal.	Include woman in rural areas in the activities of the project through gender-responsive budgeting exercise	Carbon sequestration and its link to biodiversity and mitigation for climate change
17	67	Livestock management to improve livelihood and resource conservation	**UNCCD-Article 17** *COP2/CST2* *COP3/CST 3*	Research and development	• Conduct joint research and training programs.	Conduct joint programmes in the fields of research, training and systematic observation and information collection.	Upgrade of rangeland strategy to include programs on improving livestock management	• Review NAP programs. • Review reports of previous projects in the Badia.	• Identify methods that link livestock management with combating desertification. • Consult BRP road map on interventions.	• Analogue models. • Ground surveys • DOS data and reports.	• Setup plans to empower and train woman in the sector of livestock management. • Link and integrate the work with projects at household level in rural areas.	Link overgrazing with soil erosion and reduction in soil organic carbon.
18	66	Soil carbon and soil erosion	CRIC 1	Reviewing reports of UNCCD	UNCCD Linkages and synergies with other conventions.	Research needs in the area of synergy	Upgrade of the draft of soil protection.	• Review CST reports and proceedings of the first scientific conference. • Consult output 4.3 of the IFS.	• Work with the three TRG at MoEnv to prepare proposals for synergy. • Consider GEF and environment protection fund. • Consider	• Databases of soils, vegetation, water and climate. • Remote sensing and GIS tools. • USLE and GIS based models	Emphasize the role of gender empowerment in the areas of synergy and provide mechanisms towards small projects that enhance carbon sequestration	Carbon sequestration and improvement of ecosystem functions and their link to mitigation for climate change
19	65	Use of equilibrium models for rangeland restoration	**UNCCD-Article 17**	Research and	Promoting, adopting and	Conduct joint programmes	Lack of SLM in the strategies of	• Review BRP roadmap and program 4 of	• Prepare proposals jointly with	• Databases of socioeconomic and	Setup plans to improve woman skills in the	Carbon sequestration and its

Overall Rank and Score of Prioritized Desertification Research Topics		DESERTIFICATION Topic Prioritized (Policy-oriented *Research* Needed to Address National Gaps)	Article	Mandate	Provisions/main themes	Specific obligation(s) to Jordan	National Legislation Gap	Specific Research Sub-Guidelines	Specific Research Sub-Procedures	Research Tools	Gender Mainstreaming	Synergies
Overall Rank	Score											
				developmen t	enhancing transfer of technology relevant to combating desertificati on.	in the fields of research, training and systematic observation and information collection.	MOMA, MOE, MWI and Youth. Upgrade of rangeland strategy to include related programs and objectives.	NAP. • Review reports of RSCN and BRDC. • Consult CAP of BRP for packages of interventions.	MOA, NCARE and MoEnv. • Consider GEF, UNDP, IDRC and BRP as sources of fund.	biophysical factors. • Remote sensing and GIS tools. • Rapid rural appraisal	sector of livestock management.	link to biodiversity and mitigation for climate change
20	64	Assessment of the impacts of policies and economic structural programs on desertification	**UNCCD-Article 4**	General obligations	• Adopting an integrated approach for implementat ion	Adopting an integrated approach and a collaboration mechanism among relevant institutions.	Need to upgrade strategy of MOSD to link sustainable livelihood and resource management with poverty eradication.	Consult program 3 of NAP and outputs 1.1 and 1.2 of IFS.	• Prioritize decentralizati on and consider reviewing policies and strategies.	• Analogue and economic models • DOS data and reports Workshops and meetings	• Emphasize gender empowermen t by linking impacts to household income levels and poverty.	Assessmen t of socio-economic impacts with broad focus including all sectors and an overall impact on economy and vice versa

2.4.3. Summary of biodiversity research priorities, guidelines, procedures and tools

The policy-oriented research guidelines, procedures and tools were developed according to the biodiversity research thematic areas that are proposed and updated by the Subsidiary Body for Scientific, Technical and Technological Advice (SBSTA) for Biodiversity, the SBSTTA subsequent reports, resolutions, and recommendations were reviewed, investigated, and integrated in the assignment of biodiversity research priorities, guidelines, procedures and tools. The tools are proposed based on the needs to apply suggested research that cope with prioritization criteria. Table 9 shows the main tools that help researchers and biodiversity stake holders to accomplish the policy-oriented research. The biodiversity tool kit comprises technical and managerial aids to carry out research of priority. The biodiversity suggested tools are a) Modelling assessments: This may include models and /or protocols developed by research communities to be used in biodiversity status assessments like protocols for the in situ and ex situ conservation, diversity analysis like Shannon diversity index, distribution maps, vegetation surveys, inventory, vulnerability, mitigation and adaptation research fields, monitoring and reporting, ecosystem services, fragmentations, biosafety, etc. b) Data banking like geo referencing database,

remote sensing data for biodiversity distribution maps, genebanks database, etc. and c) Global data networks like gringlobal. A detail description of tools is presented in Annex 3.

TABLE 9: SUMMARY OF BIODIVERSITY RESEARCH PRIORITIES, GUIDELINES, PROCEDURES AND TOOLS

Overall Rank and Score of Prioritized Biodiversity Research Topics		BIODIVERSITY Topics Prioritized (Policy-oriented *Research* Needed to Address National Gaps)*	Article or COP decision	Mandate	Provisions /main themes	Specific obligation to Jordan	National legislation gap (law/policy)	Policy-oriented research needed to address gaps	Specific research sub-guidelines	Specific research sub-procedures	Research Tools (if any)**	Gender Mainstreaming	Synergies
Overall Rank	Score												
1	81.4	2.9 Developing national genetic resources strategy and regulations	CBD Article 6, COPs 1,2,5,8	General Measures for Conservation and Sustainable Use	- Integrate the conservation and sustainable use of biological diversity into relevant sectoral or cross-sectoral plans, programmes and policies. - Operate the Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA). - Participation of the CBD to the Commission on Sustainable Developm	- Develop Biodiversity national strategy. - Scientific and technical information to be contained in the national reports. - Adopts the Global Strategy for Plant Conservation including global targets for 2010.	- Lack of uniform and definite national biodiversity legislations and regulations. - Need for measurement and monitoring unit for conservation and sustainable use of biodiversity	- Develop and implement national biodiversity regulations for conservation and sustainable use of biodiversity. - Establishment of the National Subsidiary Body for Technical and technological advise for biodiversity.	- Categorize institutional and political settings needs for conservation of biodiversity and sustainable use of its component. - NBDSA proposed projects and HCST prioritized research. - COPs decisions. - SBSTTA recommendations.	- Integrate biodiversity stakeholders - Consider public, local and indigenous communities, and gender mainstream in the process of biodiversity conservation and sustainable utilization. - The national thematic research group of biodiversity.	- Media - Awareness workshops. - Biodiversity networks. - Resilience gene. 1.9 Remote sensing satellite data, Thematic Mapper (TM) data), Discriminating analyses between climate-trigged and human-induced vegetation degradation.	- Capacity building of gender in strategies and technologies relevant to conservation and sustainable utilization of biodiversity. - Contribution in developing and updating biodiversity laws, strategies, and action plans. - Enhance role of women in research and ministerial communities. - Consider the gender roles and combination of family in climate change, desertification and biodiversity programs.	Synergy with climate change and desertification in developing and implementing legislations 1.9. Synergy with climate change and desertification in monitoring systems
2	81.0	1.8 Monitor, measure and evaluate the climate change and desertification on biodiversity components											
4	80.2	1.9 Monitor, measure, and evaluate the effectiveness of adaptation activities toward climate change and desertification.											
5	80.0	4.11 Enforce and activate legislations and regulations relevant to forest ecosystem.											
6	79.8	4.5 Conservation ecosystem and reduce industrial and urbanization activities											
8	79.0	5.6 Enforce and activate legislations											

Overall Rank and Score of Prioritized Biodiversity Research Topics		BIODIVERSITY Topics Prioritized (Policy-oriented *Research* Needed to Address National Gaps)*	Article or COP decision	Mandate	Provisions /main themes	Specific obligation to Jordan	National legislation gap (law/policy)	Policy-oriented research needed to address gaps	Specific research sub-guidelines	Specific research sub-procedures	Research Tools (if any)**	Gender Mainstreaming	Synergies
Overall Rank	Score												
		and regulations relevant to forest ecosystem.			ent. - Recognize the importance of BD conservation to adaptation to climate change.								
11	78.4	1.6 Drought prediction and impacts on biodiversity and genetic resources.											
13	77.8	1.4 Develop, adopt a policy instrument, and commence implementing an effective, participatory and updated national biodiversity strategy and action plan that copes with climate change											
16	77.2	7.4 Understanding roles of wetlands in climate change regulation (i.e. through sequestering and releasing a major proportion of fixed carbon in the biosphere).											
25	74.8	3.14 Drought prediction and impacts on natural resources and ecology											
33	72.0												

Overall Rank and Score of Prioritized Biodiversity Research Topics		BIODIVERSITY Topics Prioritized (Policy-oriented *Research* Needed to Address National Gaps)*	Article or COP decision	Mandate	Provisions /main themes	Specific obligation to Jordan	National legislation gap (law/policy)	Policy-oriented research needed to address gaps	Specific research sub-guidelines	Specific research sub-procedures	Research Tools (if any)**	Gender Mainstreaming	Synergies
Overall Rank	Score												
34	71.8	4.10 Effect of deforestation on biodiversity 4.1 Remote sensing and GIS modelling for studying rainfall influences on											
35	71.6	forests. 3.4 Assessment of rangeland degradation and											
37	69.6	rehabilitation. 1.10 Spatial and temporal analysis for biodiversity											
47	63.4	variability. 1.2 link between climate change and											
48	63.0	extinction risks 3.2 Vegetation cover modelling in relation to climate											
49	61.8	change impacts. 5.10 Environmental impact assessment of oil shale mining methods.											

Overall Rank and Score of Prioritized Biodiversity Research Topics		BIODIVERSITY Topics Prioritized (Policy-oriented *Research* Needed to Address National Gaps)*	Article or COP decision	Mandate	Provisions /main themes	Specific obligation to Jordan	National legislation gap (law/policy)	Policy-oriented research needed to address gaps	Specific research sub-guidelines	Specific research sub-procedures	Research Tools (if any)**	Gender Mainstreaming	Synergies
Overall Rank	Score												
3	80.6	4.12 Protect wildlife and completing the protected area networks.	CBD Article 8, COPs 5, 6	In-situ conservation	- Develop guidelines for the selection protected areas. - Regulate biological resources. - Promote the protection of ecosystems. - Promote development in areas adjacent to protected areas. - Rehabilitate degraded ecosystems. - Prevent the introduction of alien species - Maintain indigenous knowledge and local	- Establish protected areas. - Establish means to regulate manage or control the risks associated with the use and release of living modified organisms which have adverse impacts on biological diversity.	- Legislations relevant to protected areas and land use are general and fragmented in MoEnv, MoA, and MWI. - Regulations on biosafety and LMOs are ineffective. - Policy and strategy of biodiversity conservation and sustainable utilization are not tackled by the MoSD.	- Review and develop national legislations relevant to protected areas and land use. - Adopt, implement, and disseminate regulations on biosafety and LMOs. - Integrate indigenous, local communities, and gender concept for in-situ conservation.	- Available biodiversity strategies in MoEnv, MoA, and MWI. - RSCN project on "Environment monitoring and protection in Jordan through the provision of an online real-time Data collection platform. - Frequent SBSTTA reports and recommendations. - Badia Restoration Program (BRP). - IUCN project on biodiversity and habitat loss, and Species extinction.	- Enhance the role of the MoEnv as a focal point in biodiversity research. - Transfer results to decision makers. - Address causes of biodiversity loss by mainstreaming biodiversity across government and society. -Take steps to implement plans for sustainable production and consumption and kept the impacts of use of natural	8.2. Remote sensing. 8.1 Informant consensus factor (ICF). Ethnobotanical techniques. Interviews. Community chain analysis for medicinal and herbal plants. Marketing analysis and demand. Small enterprise outcomes from dry and fresh production. 4.3. Identified microbial diversity, NCARE genebank, water harvest. 2.11 GMO's national protocol. 3.7 Interview with	8.2. Advocate equal opportunities of women and men in research. - Encourage women to perform researches, conduct studies, and access national and international funds. 8.1, 4.3, 2,11, , 3.7,. - Contribution in developing and updating biodiversity laws, strategies, and action plans. - Gender empowerment in supplementary benefits, costs of biodiversity loss, and constraints and opportunities. - Carry out awareness campaigns and training	8.2. Synergy with climate change and desertification in monitoring systems programs. 8.1. Synergy with desertification in improving Badia ecosystems, livelihood and rehabilitation programs
5	80.0	3.5 Conservation of wild life through ecosystem management											
6	79.8	8.2. Frequent environment monitoring and protection in Jordan through the provision of an online real-time data collection platform.											
6	79.8	3.7 Develop legislation relevant to land ownership and rangeland use											
7	79.4	8.1 Establishment of rangeland reserves on public lands to be managed by cooperative societies of											
9	78.8	livestock breeders living in reserve areas											
11	78.4	5.7 Protect mountain											

Overall Rank and Score of Prioritized Biodiversity Research Topics		BIODIVERSITY Topics Prioritized (Policy-oriented *Research* Needed to Address National Gaps)*	Article or COP decision	Mandate	Provisions /main themes	Specific obligation to Jordan	National legislation gap (law/policy)	Policy-oriented research needed to address gaps	Specific research sub-guidelines	Specific research sub-procedures	Research Tools (if any)**	Gender Mainstreaming	Synergies
Overall Rank	Score												
11	78.4	vegetation from invasive of alien species. 2.11 Adopting and disseminating regulations of GMOs.			communities. - Develop BT legislation. - Recognize the benefits from biodiversity for poverty alleviation. 7- Identification and dissemination of best management practices, including knowledge, innovations and practices of indigenous and local communities.					resources well within safe ecological limits. - Land use law.	rangeland residents. Questionnaires. Rangeland natural resources studies. Rangeland cultural heritage studies, Rangeland ecosystem services reports.	programs in biodiversity conservation and sustainable utilization. - Acknowledge women access to local knowledge and know how. - Gender empowerment in small and medium enterprises. - Gender empowerment in private sectors and NGOs. - Gender empowerment in biodiversity workshops and media. - Manage and monitor gender equity. - Advocate equal opportunities of women and men in research. - Gender employment in small-scale economically	
12	78.2	3.9 Advocate natural reserves and protected areas 5.5 Advocate socio-economical programs for sustainability of mountain ecological system											
14	77.6	4.8 Assess vulnerability and fragmentation and adopt in situ conservation techniques like corridors											
14	77.6	4.4 Propagation and production of forest and range plants.											
15	77.4	5.3 Monitor fragility of mountain ecosystems and species and their											
17	76.8												

Overall Rank and Score of Prioritized Biodiversity Research Topics		BIODIVERSITY Topics Prioritized (Policy-oriented *Research* Needed to Address National Gaps)*	Article or COP decision	Mandate	Provisions /main themes	Specific obligation to Jordan	National legislation gap (law/policy)	Policy-oriented research needed to address gaps	Specific research sub-guidelines	Specific research sub-procedures	Research Tools (if any)**	Gender Mainstreaming	Synergies
Overall Rank	Score												
18 25 26 27	76.6 74.8 74.6 74.0	vulnerability to human and natural disturbances 6.1 Identification of marine species and understanding marine ecosystem. 4.3 Rehabilitation approaches of forests areas. 6.2 Corel reef conservation 5.2 Protect mountain ecosystem from soil erosion and constructions. 3.8 Monitor, measure, and frequent assessment of vegetation cover										feasible applications - Enhance role of women in research and ministerial communities.	
1 13	81.4 77.8	2.9 Developing national genetic resources strategy and regulations. 2.1 Collection, conservation and characterization of endangered local genetic resources.	CBD Article 9, COP2,6	Ex-situ conservation	- Adopt ex-situ conservation as a complementary process to In situ conservation. - Establish	- Regulate and manage collection of biological resources from natural habitats.	- There is no adoption for definite national regulations neither national strategy for national genetic resources collection, conservation, maintenance,	- Adopt and implement effective regulations on management and collection of biological resources from natural habitats.	- National policies and strategies relevant to biodiversity at the MoEnv, MoA, and MWI. - RSCN studies on species at risk. - Frequent	- Seek for financial and technical support for research through linking the policy oriented	2.9. SWOT analysis. Identifying gaps and needs. National reports (FAO, CBD. 2.1. Flora and fauna references,	2.9. - Contribution in developing and updating biodiversity laws, strategies, and action plans. 2.1, 2.2,4.3. - Carry out awareness	Synergy with climate change and desertification in rehabilitation programs and gene resilience.

Overall Rank and Score of Prioritized Biodiversity Research Topics		BIODIVERSITY Topics Prioritized (Policy-oriented *Research* Needed to Address National Gaps)*	Article or COP decision	Mandate	Provisions /main themes	Specific obligation to Jordan	National legislation gap (law/policy)	Policy-oriented research needed to address gaps	Specific research sub-guidelines	Specific research sub-procedures	Research Tools (if any)**	Gender Mainstreaming	Synergies
Overall Rank	Score												
18 24 36 43 46	76.6 75.0 70.0 65.4 63.8	4.3 Rehabilitation approaches. 2.2 Establishing national gene bank. 1.5 Conservation and maintaining species and genetic stock in zoos, aquaria and gene banks. 5.4 Establishment of green belts and botanic garden. 3.6 Livestock and breed conservation			and maintain ex-situ conservation facilities. - Adopt measures for rehabilitation of threatened species. - Establish and maintain facilities for ex-situ conservation of and research on plants, animals and micro-organisms. - Adopt measures for the recovery and rehabilitation of threatened species.		germplasm movements and exchanges, and overall management of biological resources from natural habitats. - Funds are limited to facilitate ex situ conservation. - Rehabilitation programs needs to be advocated using local species	- Improve the Nature Protection Fund at the MoEnv. - Activate the national committee for plant genetic resources. - Advocate the national committee for biodiversity. - Promote the work of the Thematic Research Group for biodiversity.	SBSTTA reports and recommendations. - NCARE project (2001-2004) on improving soil conservation and conserve agricultural natural resources. - RFP1, CB2 , 2011 report on mechanism for collaboration between policy and research institutions in relations to Rio Conventions'.	research in the areas CBD with the priorities of the funding agencies. - Nature Protection Fund at the MoEnv. - Integrate global environmental issues and provisions of the CBD into policies based on research.	Red check list, Meteorological data, Ex situ Techniques (genebank, humidity control, field bank, etc.), Descriptors, Morphological data and Molecular markers. 2.2. Data base, genetic material exchange system, Herbarium, Humidity system, laboratories, Cryopreservation, Tissue culture. Gene library, Livestock conservatory. 4.3. Native species, Water harvest.	campaigns and training programs in biodiversity conservation and sustainable utilization. - Capacity building of gender in strategies and technologies relevant to conservation and sustainable utilization of biodiversity. - Encourage women to perform researches, conduct studies, and access national and international funds. -Acknowledge women access to local knowledge and know how.	
5	80.0	5.1 Identification and management hotspots in	CBD Article 10, COP1, 2,5	Sustainable Use of Compone	- Integrate conservation and	- Support developing national	- The biodiversity action plan	- Identifying ways, means and action to	- Jordan's National Agenda 21: "Small	- Badia bench mark	5.1. Conservation planning,	5.1, 3.12, 2.3,2.10. - Gender	Synergy with climate

Overall Rank and Score of Prioritized Biodiversity Research Topics		BIODIVERSITY Topics Prioritized (Policy-oriented *Research* Needed to Address National Gaps)*	Article or COP decision	Mandate	Provisions /main themes	Specific obligation to Jordan	National legislation gap (law/policy)	Policy-oriented research needed to address gaps	Specific research sub-guidelines	Specific research sub-procedures	Research Tools (if any)**	Gender Mainstreaming	Synergies
Overall Rank	Score												
5 5 7 7	80.0 79.4 79.4 78.8 76.4	mountain regions (e.g. ecosystem diversity, species richness, endemic and endangered species, genetic diversity of crop, livestock, and their wild relatives). 4.6 Maintenance of forest species combinations and ecosystem services 3.12 Enhancement the role of woman as a traditional leadership in the Bedouin society in biodiversity protection. 3.13 Enhance medicinal and herbal production as supplementary income to poor communities. 2.10 Addressing the value of biodiversity and genetic resources on agricultural development and food security 4.7 Identifying and		nts of Biological Diversity	sustainable use of biological resources into national decision-making. - Adopt measures relating to the use of biological resources. - Protect use of biological resources in accordance with traditional cultural practices. - Support local populations in BD degraded areas. - Encourage cooperation between government and private	strategies and programmes and promote the integration of biological-diversity concerns in sectoral and cross-sectoral plans.	needs to be implemented and frequently updated to cope with new global challenges like climate change and water scarcity. - The components of biological diversity in Jordan are identified but no programs are developed for sustainable utilization of BD components. - Limited Governmental efforts are exist to integrate indigenous and local communities in sustainable protection of biodiversity	start the process of considering the components of biological diversity particularly those under threat. - Accreditation of scientific and technical information to be contained in the national reports. - Advocate programs to maximize the role of women in the process of conservation, support local communities	Country, Big Ideas" - RFP1, CB2 , 2011 report on mechanism for collaboration between policy and research institutions in relations to Rio Conventions'. - NBDSA proposed projects and HCST prioritized research. - National Agenda, the Jordan We Strive For, 2006-2015 - The National Strategy for Agricultural Development 2002- 2010 (NSAD).	reports. - Introduce to proposals and calls basic gender concepts relevant for CBD. - Research data bank. - National Development Committee to identify of national policy-oriented research needs to accomplish sustainability. - Environmental Sustainability Index (ESI). - Nature Protection Fund at the	geographic information system, land classes, WWF and IUCN-for biodiversity patterns, vulnerability to threatening processes, taxonomic rank and character differences between species. 3.12. Rapid rural appraisal for socioeconomic studies, Interview with rangeland residents, small enterprise outcomes. 3.2 Cereal and vegetable local cultivars and landraces. Farmers union. Local	empowerment in private sectors and NGOs. - Acknowledge women access to local knowledge and know how. - Gender empowerment in supplementary benefits, the costs of biodiversity loss, impacts of response measures, and constraints and opportunities. - Consider the gender roles and combination of family. - Gender employment in small-scale economically feasible applications - Enhance role of women in research and ministerial communities.	change and desertification in monitoring vegetation and ecosystem, rehabilitation programs and gene resilience.

Overall Rank and Score of Prioritized Biodiversity Research Topics		BIODIVERSITY Topics Prioritized (Policy-oriented *Research* Needed to Address National Gaps)*	Article or COP decision	Mandate	Provisions /main themes	Specific obligation to Jordan	National legislation gap (law/policy)	Policy-oriented research needed to address gaps	Specific research sub-guidelines	Specific research sub-procedures	Research Tools (if any)**	Gender Mainstreaming	Synergies
Overall Rank	Score												
9 19 21 21	76.0 76.4 76.0 76.0	characterizing forest species and their specific habitats (niches) and hot spots. 6.3 Assess value of marine biodiversity 2.5 Utilization of Jordanian genetic resources and landraces to mitigate impact of climate change and desertification 4.7 Identifying and characterizing forest species and their specific habitats (niches) and hot spots. 6.3 Assess value of marine biodiversity 2.5 Utilization of Jordanian genetic resources and landraces to mitigate impact of climate change and			sector in developing methods for sustainable use of biological resources. - Identifying biological diversity components under threat that could be taken under the Convention					MoEnv.	communities. Traditional Knowledge. 2.10. G.M.E (genotype–management–environment) interactions. Workshops and field days to elaborate the lack of adaptation of improved varieties to heterogeneous and marginal production areas emphasis on wide rather than local adaptation.		

Overall Rank and Score of Prioritized Biodiversity Research Topics		BIODIVERSITY Topics Prioritized (Policy-oriented *Research* Needed to Address National Gaps)*	Article or COP decision	Mandate	Provisions /main themes	Specific obligation to Jordan	National legislation gap (law/policy)	Policy-oriented research needed to address gaps	Specific research sub-guidelines	Specific research sub-procedures	Research Tools (if any)**	Gender Mainstreaming	Synergies
Overall Rank	**Score**												
23 32 42 46	75.4 72.4 66.6 63.8	desertification 2.3 Develop agrobiodiversity system to conserve and sustainably use local varieties, landraces and livestock. 4.9 Forest evaluation as a touristic and environmental resource. 7.6 Improve wetland ecosystem such as mangroves and river floodplains to mitigating the impacts of extreme weather events. 3.11 Arrangement of postural system and grazing											
28	73.8	1.11 Establishing national centre for biodiversity research and technology transfer.	CBD Article 12, COP 4	Research and training	- Establish and maintain programmes for education	- Develop and maintain programmes for education	There are limited governmental programs and plans to support universities and research centres	- Need for Establishment of national Subsidiary Body on Scientific,	- RFP1, CB2 , 2011 report on mechanism for collaboration between policy	- Establishment of research council at the	1.11. Field bank. Seed bank. Database. Network with national	1.11. - Advocate equal opportunities of women and men in research.	- Synergy with desertification in rehabilitation and

Overall Rank and Score of Prioritized Biodiversity Research Topics		BIODIVERSITY Topics Prioritized (Policy-oriented *Research* Needed to Address National Gaps)*	Article or COP decision	Mandate	Provisions /main themes	Specific obligation to Jordan	National legislation gap (law/policy)	Policy-oriented research needed to address gaps	Specific research sub-guidelines	Specific research sub-procedures	Research Tools (if any)**	Gender Mainstreaming	Synergies
Overall Rank	Score												
30	73.2	1.12 Integrated information database for biodiversity risk assessment.			and training in measures for BD. - Promote research of conservation and sustainable use of BD.	and training in measures for BD.	to conduct researches relevant to CBD.	Technical and Technological Advice - Need for establishment a unit of research and training on BD at the MoEnv.	and research institutions in relations to Rio Conventions-NBDSA proposed projects and HCST prioritized research.	MoEnv. - Empower the national Thematic Research Group of biodiversity. - Establish Revising Committee responsible for reviewing, editing and submitting the oriented-research proposals	BD institutes. Biotechnology laboratory (cryopreservation, tissue culture, thermocycler, DNA sequencer). Nursery. Herbarium. Qualified staff.	- Encourage women to perform researches, conduct studies, and access national and international funds. - Manage and monitor gender equity. - Gender employment in small-scale economically feasible applications - Enhance role of women in research and ministerial communities.	restoration research.
7 10	79.4 78.6	7.1 Advocate local communities to re-establish develop and implement traditional approaches to conserve and sustain the use of the biological diversity. 6.5 Build corporation with governmental	CBD Article 13, COP 4,5,7,8	Public Education and Awareness	- Cooperate with international organizations in developing educational and public awareness. - Adopts	- Promote understanding of the importance of, and the measures required for, the conservation of biological diversity through	- Almost there are no definite and time line programs on biodiversity awareness CBD. - Limited cooperation between Institutions of high concern of biodiversity issues (MoEnv, MoA, MWI) and	- Advocate Integration of the public in programs relevant to the biodiversity including its importance, conservation and sustainable utilization.	- Policy and national strategy of the Ministry of Social Development. - The National Strategy for Agricultural Development 2002- 2010 (NSAD). - Frequent SBSTTA reports and	- Initiate awareness working group belong to the biodiversity development committee. - Plans, organizes,	1.7. Awareness workshops. Media programs. Websites. 7.1. Ecologically Sustainable Development and Conservation. Convention on Biological	1.7, 7.1. - Carry out awareness campaigns and training programs in biodiversity conservation and sustainable utilization. - Gender empowerment in supplementary benefits, the	- Synergy with climate change in awareness regarding mitigation the impact of climate change on biodiversity. - Synergy with

Overall Rank and Score of Prioritized Biodiversity Research Topics		BIODIVERSITY Topics Prioritized (Policy-oriented *Research* Needed to Address National Gaps)*	Article or COP decision	Mandate	Provisions /main themes	Specific obligation to Jordan	National legislation gap (law/policy)	Policy-oriented research needed to address gaps	Specific research sub-guidelines	Specific research sub-procedures	Research Tools (if any)**	Gender Mainstreaming	Synergies
Overall Rank	Score												
20 22 32 40	76.2 75.8 72.4 68.4	organization, NGOs and local communities to protect marine ecosystem. 1.7 Build capacities and involve local and indigenous communities in management programs of biodiversity protection and sustainable use of natural resource. 1.3 Ecosystem-based Adaptation (Restoration and rehabilitation of ecosystems using proper techniques and local species) 2.8 Participate public and research communities in conservation of Biodiversity. 2.7 Participate farmers and local communities in the process of sustainable utilization of biodiversity			the Global Strategy for Plant Conservation, including outcome-oriented global targets for 2010.	media, and the inclusion of these topics in educational programmes	the Ministry of Social Development		recommendations. - National Agenda, the Jordan We Strive For, 2006-2015	and patronages awareness events. - Ensures advocacy for national, regional and international biodiversity issues identified by the CBD and relevant national entities, and ensures awareness activities for the public and private	Diversity-public awareness	costs of biodiversity loss, impacts of response measures, and constraints and opportunities. - Contribution in developing and updating biodiversity laws, strategies, and action plans. - Developing websites with timely information on role of women in maintaining biodiversity.	desertification in awareness programs relevant poverty alleviation and improvement of livelihood.

Overall Rank and Score of Prioritized Biodiversity Research Topics		BIODIVERSITY Topics Prioritized (Policy-oriented *Research* Needed to Address National Gaps)*	Article or COP decision	Mandate	Provisions /main themes	Specific obligation to Jordan	National legislation gap (law/policy)	Policy-oriented research needed to address gaps	Specific research sub-guidelines	Specific research sub-procedures	Research Tools (if any)**	Gender Mainstreaming	Synergies
Overall Rank	Score												
		component											
4 12 18 23 39	80.2 78.2 76.6 75.4 69.0	9.1 Developing a national database for Jordan flora and fauna. 4.2 Documentation of traditional knowledge related to forest biodiversity. 7.5 Developing and upgrading a data bank for groundwater and surface water basins in Jordan. 9.2 Complete flora of Jordan. 7.2 Identification of wetland biodiversity.	CBD Article 17, COP 7	Exchange of information	- Facilitate the exchange of information relevant to the conservation and sustainable use of biological diversity. - Promote and facilitate technical and scientific cooperation and the exchange of information on technology transfer at the regional and national levels.	- Exchange of information shall include exchange of results of technical, scientific and socio-economic research and indigenous knowledge.	- Lack of uniform and definite national biodiversity legislations and regulations that cover the issue of information exchange including conservation and sustainable utilization.	- Adopt comprehensive and uniform, coherent and wide-range data base on biodiversity of Jordan. - Develop national legislation to encourage exchange information including exchange of results of technical, scientific and socio-economic research and indigenous knowledge.	- RFP1, CB2 , 2011 report on mechanism for collaboration between policy and research institutions in relations to Rio Conventions' - National Agenda, the Jordan We Strive For, 2006-2015. - HCST prioritized research.	- Develop Research Data Bank. - Accessing Research Findings and Reports Online. - Jordan Environmental information system (JEIS) produced by RFP1, CB2 , 2011 on mechanism for collaboration between policy and research institutions in relations to Rio Conventions'.	4.2. Socioeconomic data via questionnaires, Database. (e.g. FOXPRO), Local communities, Traditional and ethno-botanical information, Interviews. Networks. 9.1. Web sites, networks. Link with national and international biodiversity information database, Link with Jordan Environmental information system (JEIS). List of vascular plant of Jordan. Vegetation	4.2. - Acknowledge women access to local knowledge and know how. - Consider the gender roles and combination of family. 9.1. - Developing websites with timely information on role of women in maintaining biodiversity. - Gender empowerment in supplementary benefits, the costs of biodiversity loss, impacts of response measures, and constraints and opportunities. - Encourage women to perform researches,	Synergy with climate change and desertification in data banking and meteorological information programs.

Overall Rank and Score of Prioritized Biodiversity Research Topics		BIODIVERSITY Topics Prioritized (Policy-oriented *Research* Needed to Address National Gaps)*	Article or COP decision	Mandate	Provisions /main themes	Specific obligation to Jordan	National legislation gap (law/policy)	Policy-oriented research needed to address gaps	Specific research sub-guidelines	Specific research sub-procedures	Research Tools (if any)**	Gender Mainstreaming	Synergies
Overall Rank	Score												
											map of Jordan. List of species residing in Jordan reserves, data base monitoring	conduct studies, and access national and international funds.	
10 28	78.6 73.8	6.5 Build corporation with governmental organization, NGOs and local communities to protect marine ecosystem. 1.11 Establishing national centre for biodiversity research and technology transfer.	CBD Article 18, COP 2, 3, 5, 6	Technical and Scientific Cooperation	- Promote the establishment of joint research programs. - Cooperation with other biodiversity-related conventions. - Memorandum of understanding between COP- CBD and the Global Environment Facility (GEF). - Encourage and develop	- Promote international cooperation in the field of conservation and sustainable use of biological diversity. through the international and national institutions. - Promote technical and scientific cooperation through the development and implementation of	- Guidelines for international cooperation in the field of conservation and sustainable use of biological diversity that are available in national institutes and ministries are limited, fragmented and inconsistent.	- Develop uniform Guidelines and procedures for international cooperation in the field of conservation and sustainable use of biological diversity	- National Agenda, the Jordan We Strive For, 2006-2015. - HCST prioritized research. - Frequent SBSTTA reports and recommendations.	- Review National Progress - Search for new Funding Resources - Develop Research Council Unit at the MoEnv. - Sustainable Guidelines, Procedures and Tools for Policy Oriented Research	1.11. Network with national BD institutes, International cooperation unit within the centre to follow up cooperation with national, regional and international agencies particularly those providing fund, Qualified staff. 6.5. Stake holders. Legislations. Fund raising. Infrastructure	1.11. - Gender empowerment in supplementary benefits, the costs of biodiversity loss, impacts of response measures, and constraints and opportunities. - Encourage women to perform BT researches and access national and international funds. 6.5. - Gender empowerment in private sectors and NGOs.	Synergy with climate change and desertification in access to information and data banking programs. - Synergy with climate change in collaboration with international environmental agencies like GEF.

Overall Rank and Score of Prioritized Biodiversity Research Topics		BIODIVERSITY Topics Prioritized (Policy-oriented *Research* Needed to Address National Gaps)*	Article or COP decision	Mandate	Provisions /main themes	Specific obligation to Jordan	National legislation gap (law/policy)	Policy-oriented research needed to address gaps	Specific research sub-guidelines	Specific research sub-procedures	Research Tools (if any)**	Gender Mainstreaming	Synergies
Overall Rank	Score												
					methods of cooperation for the development and use of technologies.	national policies.							
11	78.4	2.11 Adopting and disseminating regulations of GMOs	CBD Article 19, EXCOP 1	Handling of biotechnology and distribution of its benefits	- Consider the need for safe transfer, handling and use of LMO resulting from biotechnology that may have adverse effect on the conservation and sustainable use of biological diversity. be introduced.	- Take practicable measures to promote access on a fair and equitable basis to the results and benefits arising from biotechnologies based upon genetic resources. -Need for a protocol on handling and use of LMO resulting	- Week progress is achieved on implementing the national biosafety protocol.	- The national protocol on biosafety needs to be implemented and disseminated to public.	- National Biodiversity Strategy and action plan (NBSAP) - Jordan Standards and Metrology Organization (JSMO) for accrediting testing and calibration laboratories and certification bodies.	- Data Bank for LMO. - Jordan Food and Drug organization (FDJ) for accrediting food and drug testing and calibration laboratories and certification bodies.	2.11 Apply GMO's national protocol through Media, patronage workshops, awareness campaign and educational modules.	- Capacity building of gender in strategies and technologies relevant to LMO. - Contribution in developing and updating biodiversity laws, strategies, and action plans.	Synergy with climate change in mitigation projects by using resilience gene.

Overall Rank and Score of Prioritized Biodiversity Research Topics		BIODIVERSITY Topics Prioritized (Policy-oriented *Research* Needed to Address National Gaps)*	Article or COP decision	Mandate	Provisions /main themes	Specific obligation to Jordan	National legislation gap (law/policy)	Policy-oriented research needed to address gaps	Specific research sub-guidelines	Specific research sub-procedures	Research Tools (if any)**	Gender Mainstreaming	Synergies
Overall Rank	Score												
						from biotechnology that may have adverse effect on the conservation and sustainable use of biological diversity.							
11	78.4	2.11 Adopting and disseminating regulations of GMOs	Cartagena Protocol Article 2, COP-MOP1	General Provisions	2. Ensure that the development, handling, transport, use, transfer and release of any LMO are undertaken in a manner that prevents or reduces the risks to biological diversity, taking also into account	Take appropriate legal, administrative to implement its obligations under this Protocol.	- Need to develop, ratify and implement the Bio-safety national Law and regulations.	Develop and implement the Bio-safety national Law and regulations.	- National Biodiversity Strategy and action plan (NBSAP) - National community on biosafety. - The Bio-safety section at the MoEnv	- Jordan Food and Drug organization (FDJ) for accrediting food and drug testing and calibration laboratories and certification bodies.	2.11 Gmo's national protocol.	- Capacity building of gender in strategies and technologies relevant to LMO. - Contribution in developing and updating biodiversity laws, strategies, and action plans.	Synergy with climate change in mitigation projects by using resilience gene.

Overall Rank and Score of Prioritized Biodiversity Research Topics		BIODIVERSITY Topics Prioritized (Policy-oriented *Research* Needed to Address National Gaps)*	Article or COP decision	Mandate	Provisions /main themes	Specific obligation to Jordan	National legislation gap (law/policy)	Policy-oriented research needed to address gaps	Specific research sub-guidelines	Specific research sub-procedures	Research Tools (if any)**	Gender Mainstreaming	Synergies
Overall Rank	Score												
					risks to human health.								
11	78.4	2.11 Adopting and disseminating regulations of GMOs	Cartagena Protocol Article 11, COP-MOP2	Procedure for Living Modified Organisms Intended for Direct Use as Food or Feed, or For Processing	- Improve capacity for data collection and management, and the establishment of infrastructure to share information at national and international levels	- Lack of scientific certainty regarding the extent of the adverse effects of a LMO on biological diversity shall not Prevent Party from taking a decision with regard to the import of LMO intended for direct use as food or feed, or for processing, in order to avoid adverse effects.	- The Bio-safety national Law and regulations are not comprehensively developed and ratified.	Develop and implement the Bio-safety national Law and regulations.	- Jordan Standards and Metrology Organization (JSMO) for accrediting testing and calibration laboratories and certification bodies. Institutional	- Eligibility as institutional capacity, personnel and accreditation - Jordan Food and Drug organization (FDJ) for accrediting food and drug testing and calibration laboratories and certification bodies.	2.11 GMO's national protocol, protocols followed by the Jordan Food and Drug organization (FDJ) for accrediting food and drug testing and calibration laboratories and certification bodies.	- Capacity building of gender in strategies and technologies relevant to LMO. - Contribution in developing and updating biodiversity laws, strategies, and action plans.	Synergy with climate change in mitigation projects by using resilience gene.
28	73.8	1.11 Establishing national centre for biodiversity research and	Cartagena Protocol Article 12, COP-	Risk Assessment	- Risk assessments shall be carried out	- The Party of import shall ensure	- The international Risk assessments measurements	- Implementing appropriate risk	- National Biodiversity Strategy and action plan	- Jordan Standards and Metrology	1.10 Network with national BD	1.11. - Gender empowerment in supplementary	Synergy with climate change and

Overall Rank and Score of Prioritized Biodiversity Research Topics		BIODIVERSITY Topics Prioritized (Policy-oriented *Research* Needed to Address National Gaps)*	Article or COP decision	Mandate	Provisions /main themes	Specific obligation to Jordan	National legislation gap (law/policy)	Policy-oriented research needed to address gaps	Specific research sub-guidelines	Specific research sub-procedures	Research Tools (if any)**	Gender Mainstreaming	Synergies
Overall Rank	Score												
30	73.2	technology transfer. 1.12 Integrated information database for biodiversity risk assessment.	MOP1, MOP3		in a scientifically sound manner taking into account risk assessment techniques and based on information and scientific evidence in order to identify and evaluate the possible adverse effects of LMO on the conservation and sustainable use of BD. - Provide information regarding risk assessment and risk	that risk assessments are carried out and it may require the exporter to carry out the risk assessment.	are not applied in Jordan.	management strategies and/or monitoring the LMO.	(NBSAP) - National community on biosafety	Organization (JSMO) for accrediting testing and calibration laboratories and certification bodies. - Jordan Food and Drug organization (FDJ)	institutes. Biotechnology laboratories, DNA sequencer, molecular markers, Qualified staff. 1.12 Networks, Link with Jordan Environmental information system (JEIS).	benefits, the costs of biodiversity loss, impacts of response measures, and constraints and opportunities. - Encourage women to perform BT researches and access national and international funds. - Developing websites with timely information on role of women in maintaining biodiversity.	desertification in access to information and data banking programs.

Overall Rank and Score of Prioritized Biodiversity Research Topics		BIODIVERSITY Topics Prioritized (Policy-oriented *Research* Needed to Address National Gaps)*	Article or COP decision	Mandate	Provisions /main themes	Specific obligation to Jordan	National legislation gap (law/policy)	Policy-oriented research needed to address gaps	Specific research sub-guidelines	Specific research sub-procedures	Research Tools (if any)**	Gender Mainstreaming	Synergies
Overall Rank	Score												
					management of LMOs.								
11 28	78.4 73.8	2.11 Adopting and disseminating regulations of GMOs. 1.11 Establishing national centre for biodiversity research and technology transfer.	Cartagena Protocol Article 16 COP-MOP1, MOP3	Risk Management	- Taking appropriate measures regarding the treatment of LMO or specific traits.	- Establish mechanisms, measures and strategies to regulate, manage and control risks identified in the risk assessment provisions associated with the use, handling and transboundary movement of LMO. - Identify LMO that may have adverse effects on BD.	- The international Risk management measurements are not applied in Jordan.	- Implementing appropriate risk management strategies and/or monitoring the LMO.	- Jordan Standards and Metrology Organization (JSMO) for accrediting testing and calibration laboratories and certification bodies. - Jordan Food and Drug organization (FDJ)	- Jordan Standards and Metrology Organization (JSMO) for accrediting testing and calibration laboratories and certification bodies. - Jordan Food and Drug organization (FDJ)	1.11 Field bank. Seed bank. Database. Network with national BD institutes. Biotechnology laboratory (cryopreservation, tissue culture, thermo-cycler, DNA sequencer). Nursery. Herbarium. Qualified staff. 2.11 Gmo's national protocol	1.11, 2.11 - Gender empowerment in supplementary benefits, the costs of biodiversity loss, impacts of response measures, and constraints and opportunities. - Encourage women to perform BT researches and access national and international funds. - Contribution in developing and updating biodiversity laws, strategies, and action plans.	Synergy with climate change and desertification in access to information and data banking programs.
11	78.4	2.11 Adopting and disseminating regulations of	Cartagena Protocol Article 22,	Capacity-building	1. Strengthening of	1. Cooperate in the	- Weak cooperation with national and	- Adopt bio-safety Laws and	- National Biodiversity Strategy and	- Jordan Standards and	2.11 GMO's national protocol.	2.11, 1.11, 1.7. - Capacity building of	Synergy with climate

Overall Rank and Score of Prioritized Biodiversity Research Topics		BIODIVERSITY Topics Prioritized (Policy-oriented *Research* Needed to Address National Gaps)*	Article or COP decision	Mandate	Provisions /main themes	Specific obligation to Jordan	National legislation gap (law/policy)	Policy-oriented research needed to address gaps	Specific research sub-guidelines	Specific research sub-procedures	Research Tools (if any)**	Gender Mainstreaming	Synergies
Overall Rank	Score												
20	76.2	GMOs. 1.7 Build capacities and involve local and indigenous communities in management programs of biodiversity protection and sustainable use of natural resource.	COP-MOP2		human resources and institutional capacities in bio-safety. 2. Cooperation on between developing country Parties, for financial resources and access to and transfer of technology and know-how.	development and/or strengthening of human resources and institutional capacities in bio-safety, including biotechnology for the purpose of the effective implementation of this Protocol.	international bodies to promote and facilitate public awareness.	regulations. - Enhance public awareness programs and campaigns relevant to adverse effect of LMO on biodiversity. - Enhance public awareness programs relevant to property rights.	action plan (NBSAP) - National community on biosafety.	Metrology Organization (JSMO) for accrediting testing and calibration laboratories and certification bodies.	1.11 genebank, Database, Network with national BD institutes, Biotechnology laboratory (cryopreservation, tissue culture, thermocycler, DNA sequencer). Nursery. Qualified staff. 1.7. Awareness workshops. Media programs. Websites.	gender in strategies and technologies relevant to conservation and sustainable utilization of biodiversity - Gender empowerment in supplementary benefits, the costs of biodiversity loss, impacts of response measures, and constraints and opportunities. - Encourage women to perform BT researches and access national and international funds. - Contribution in developing and updating biodiversity laws, strategies, and action plans.	change in capacity building in mitigation programs by using resilience genes.
11	78.4	2.11 Adopting and disseminating regulations of	Cartagena Protocol Article 23,	Public awareness and	- Consult the public in the	- Facilitate public awareness	- Cooperation with national and international	- Consult the public in the decision-	- National community on biosafety.	- Jordan Standards and	2.12 GMO's national protocol	2.11. – Gender contribution in developing,	Synergy with climate

Overall Rank and Score of Prioritized Biodiversity Research Topics		BIODIVERSITY Topics Prioritized (Policy-oriented *Research* Needed to Address National Gaps)*	Article or COP decision	Mandate	Provisions /main themes	Specific obligation to Jordan	National legislation gap (law/policy)	Policy-oriented research needed to address gaps	Specific research sub-guidelines	Specific research sub-procedures	Research Tools (if any)**	Gender Mainstreaming	Synergies
Overall Rank	Score												
20	76.2	GMOs 1.7 Build capacities and involve local and indigenous communities in management programs of biodiversity protection and sustainable use of natural resource	COP-MOP2	participation	decision-making process regarding LMO and make the results of such decisions available to the public.	and education on Biosafety. - Endeavour to ensure that public awareness and education encompass access to information on LMO.	bodies to promote and facilitate public awareness is weak. - The biosafety Law and regulations are not adopted	making process regarding LMO - Cooperate with national and international bodies to promote and facilitate public awareness. - Adopt bio-safety Laws and regulations.	- National Agenda, the Jordan We Strive For, 2006-2015. - HCST prioritized research. - Frequent SBSTTA reports and recommendations.	Metrology Organization (JSMO) for accrediting testing and calibration laboratories and certification bodies.		updating, and implementing GMOs laws, strategies, and action plans.	change in mitigation projects by using resilience genes.
11 20	78.4 76.2	2.11 Adopting and disseminating regulations of GMOs. 1.7 Build capacities and involve local and indigenous communities in management programs of biodiversity protection and sustainable use of natural resource	Cartagena Protocol Article 26, COP-MOP4	Socio-economic considerations	1. Take into account socio-economic considerations arising from the impact of LMO on the conservation and sustainable use of BD with regard to the value of BD to indigenous		- The role of national indigenous and local communities in conserving BD from the impact of LMO is not identified in the strategies of MoSD.	- Identifying the role of national indigenous and local communities in conserving BD from the impact of LMO.	- National community on biosafety. - National Agenda, the Jordan We Strive For, 2006-2015. - HCST prioritized research. - Frequent SBSTTA reports and recommendations.	- Jordan Food and Drug organization (FDJ).	2.12 GMO's national protocol. 1.7. Awareness workshops. Media programs. Websites	2.11, 1.7. - Gender contribution in developing, updating, and implementing GMOs laws, strategies, and action plans. - Capacity building of gender in strategies and technologies relevant to LMO.	Synergy with climate change in mitigation programs using resilience genes.

Overall Rank and Score of Prioritized Biodiversity Research Topics		BIODIVERSITY Topics Prioritized (Policy-oriented *Research* Needed to Address National Gaps)*	Article or COP decision	Mandate	Provisions /main themes	Specific obligation to Jordan	National legislation gap (law/policy)	Policy-oriented research needed to address gaps	Specific research sub-guidelines	Specific research sub-procedures	Research Tools (if any)**	Gender Mainstreaming	Synergies
Overall Rank	Score												
					and local communities.								
11	78.4	2.11 Adopting and disseminating regulations of GMOs.	Cartagena Protocol Article 27, CBD COP10, COP10 Decision X/1	Liability and redress	- Adopt a process with respect to the appropriate elaboration of international rules and procedures in the field of liability and redress for damage resulting from transboundary movements of LMO.	- Adopt Nagoya – Kuala Lumpur Supplementary Protocol on Liability and redress.	- The protocol is not published in the national Gazette	- Publish the supplementary protocol on liability and redress in the national Gazette.	- National community on biosafety. - National Agenda, the Jordan We Strive For, 2006-2015. - HCST prioritized research. - Frequent SBSTTA reports and recommendations.	- Jordan Food and Drug organization (FDJ)	- Establish in the MoEnv. Sub unit for Nagoya – Kuala Lumpur Supplementary Protocol on Liability and redress 2.12 GMO's national protocol	2.11. – Gender contribution in developing, updating, and implementing GMOs laws, strategies, and action plans.	Synergy with climate change in mitigation programs by using resilience genes.
11	78.4	2.11 Adopting and disseminating regulations of GMOs	Nagoya – Kuala Lumpur Supplementary Protocol on Liability and redress,	Scope	- Applies to damage resulting from LMO which find their origin in a transboundary movement	- Include to damage resulting from LMO: the items find their origin in a trans-boundary movement	- Liability and redress are not comprehensively included in the national biosafety regulations.	- Update and maintain the national biosafety regulations considering damage resulting from LMO: the items find	- National community on biosafety. - National Agenda, the Jordan We Strive For, 2006-2015. - HCST prioritized research. - Frequent	- Jordan Food and Drug organization (FDJ). - Jordan Standards and Metrology Organizati	2.12 Gmo's national protocol	2.11. – Gender contribution in developing, updating, and implementing GMOs laws, strategies, and action plans.	Synergy with climate change in mitigation programs by using resilience genes.

Overall Rank and Score of Prioritized Biodiversity Research Topics		BIODIVERSITY Topics Prioritized (Policy-oriented *Research* Needed to Address National Gaps)*	Article or COP decision	Mandate	Provisions /main themes	Specific obligation to Jordan	National legislation gap (law/policy)	Policy-oriented research needed to address gaps	Specific research sub-guidelines	Specific research sub-procedures	Research Tools (if any)**	Gender Mainstreaming	Synergies
Overall Rank	Score												
			Article 3, COP-MOP5		. The LMO are those: Intended for direct use as food or feed, or for processing ; - Destined for contained use; Intended for intentional introduction into the environment.	, and the intended for direct use as food or feed, or for processing		their origin in a trans-boundary movement, and the intended for direct use as food or feed, or for processing	SBSTTA reports and recommendations.	on (JSMO) for accrediting testing and calibration laboratories and certification bodies.			

Overall Rank and Score of Prioritized Biodiversity Research Topics		BIODIVERSITY Topics Prioritized (Policy-oriented *Research* Needed to Address National Gaps)*	Article or COP decision	Mandate	Provisions /main themes	Specific obligation to Jordan	National legislation gap (law/policy)	Policy-oriented research needed to address gaps	Specific research sub-guidelines	Specific research sub-procedures	Research Tools (if any)**	Gender Mainstreaming	Synergies
Overall Rank	Score												
11 29	78.4 73.6	2.11 Adopting and disseminating regulations of GMOs 2.6 Identification and characterization of indigenous genetic resources in Jordan and their use using biotechnology.	Nagoya – Kuala Lumpur Supplementary Protocol on Liability and redress Article 12, COP-MOP5	Implementation and relation to civil liability	- Provide for rules and procedures that address damage, and apply existing domestic law, including procedures on civil liability.	- Adopt national procedures that address damage including procedures on civil liability.	- There is no specific domestic law on LMO liability and redress.	- Initiate to develop domestic law on LMO liability and redress.	- National community on biosafety. - National Agenda, the Jordan We Strive For, 2006-2015. - HCST prioritized research. - Frequent SBSTTA reports and recommendations.	- Jordan Food and Drug organization (FDJ)	2.11 GMO's national protocol. 2.6. International descriptors. Molecular laboratories. Gene library. Molecular markers. Physiological traits. Association analysis (e.g. Tassel). Cell culture. Caryo typing technique	2.11. – Gender contribution in developing, updating, and implementing GMOs laws, strategies, and action plans. 2.6. - Acknowledge women access to local knowledge and know how. - Gender empowerment in small and medium enterprises.	Synergy with climate change in mitigation programs by using resilience genes.
5 7	80.0 79.4	5.1 Identification and management hotspots in mountain regions (e.g. ecosystem diversity, species richness, endemic and endangered species, genetic diversity of crop, livestock, and their wild relatives) 3.12 Enhancement the role of woman as a traditional leadership in the Beduine society in	Nagoya Protocol on Access and Benefit-sharing Article 3, COP10 & COP10 Decision X/1	Scope	Genetic resources and to the benefits arising from the utilization of such resources, traditional knowledge associated with genetic resources and to the benefits arising	- Regulate and manage collection of biological resources from natural habitats	- Regulations relevant to manage collection of biological resources from natural habitats are not adopted.	- Develop, adopt and disseminate Regulations relevant to manage collection of biological resources from natural habitats.	- Policy and national strategy of the Ministry of Social Development. - The National Strategy for Agricultural Development 2002- 2010 (NSAD	- Develop Research Data Bank. - Accessing Research Findings and Reports Online.	- National database on Genetic resources and associated knowledge.	Acknowledge women access to local knowledge and know how. - Gender empowerment in small and medium enterprises.	Synergy with climate change in mitigation programs by using resilience genes.

Overall Rank and Score of Prioritized Biodiversity Research Topics		BIODIVERSITY Topics Prioritized (Policy-oriented *Research* Needed to Address National Gaps)*	Article or COP decision	Mandate	Provisions /main themes	Specific obligation to Jordan	National legislation gap (law/policy)	Policy-oriented research needed to address gaps	Specific research sub-guidelines	Specific research sub-procedures	Research Tools (if any)**	Gender Mainstreaming	Synergies
Overall Rank	Score												
33	72.0	biodiversity protection 5.9 Sustainable utilization of medicinal and herbal plant diversity designated by MHP project.			from the utilization of such knowledge .								
13	77.8	1.4 Develop, adopt a policy instrument, and commence implementing an effective, participatory and updated national biodiversity strategy and action plan that copes with climate change	Nagoya Protocol on Access and Benefit-sharing Article 5, COP10 & COP10 Decision X/1	Fair and equitable benefit-sharing	- Take legislative, administrative or policy measures with the aim of ensuring that benefits arising from the utilization of genetic resources that are held by indigenous and local communities are shared in a fair and equitable way with	- Regulate, adopt policies and strategies on utilization of genetic resources that are held by indigenous and local communities	- Policies and regulations relevant to utilization of genetic resources that are held by indigenous and local communities are not developed.	- Develop policy and regulation on utilization of genetic resources that are held by indigenous and local communities. - Disseminate and implement regulations.	- National Agenda, the Jordan We Strive For, 2006-2015. - Frequent SBSTTA reports and recommendations.	- Develop Research Data Bank. - Accessing Research Findings and Reports Online.	- Awareness programs on access and Benefit-sharing protocol.	Acknowledge women access to local knowledge and know how. - Gender empowerment in small and medium enterprises.	Synergy with climate change in mitigation programs by using resilience genes.

Overall Rank and Score of Prioritized Biodiversity Research Topics		BIODIVERSITY Topics Prioritized (Policy-oriented *Research* Needed to Address National Gaps)*	Article or COP decision	Mandate	Provisions /main themes	Specific obligation to Jordan	National legislation gap (law/policy)	Policy-oriented research needed to address gaps	Specific research sub-guidelines	Specific research sub-procedures	Research Tools (if any)**	Gender Mainstreaming	Synergies
Overall Rank	Score												
					the communities.								
13 13 51	77.8 77.8 59.8	1.4 Develop, adopt a policy instrument, and commence implementing an effective, participatory and updated national biodiversity strategy and action plan that copes with climate change 2.1 Collection, conservation and characterization of endangered local genetic resources 7.3 Survey and evaluation of land and water resources.	Nagoya Protocol on Access and Benefit-sharing Article 6	Access to genetic resources	- Access to genetic resources for their utilization shall be subject to the prior informed consent of the Party providing resources.	- Regulate and manage collection and exchange of biological resources from natural habitats	- Regulations on access to genetic resources not developed	- Develop national regulations on access to national genetic resources.	- National Agenda, the Jordan We Strive For, 2006-2015. - HCST prioritized research. - Frequent SBSTTA reports and recommendations.	- Country Endorsement-Jordan Environmental information system (JEIS) produced by RFP1, CB2 , 2011 on mechanism for collaboration between policy and research institutions in relations to Rio Conventions	1.4. Building institutional capacities. Integrate biodiversity stakeholders in National biodiversity policies, strategies and action plan. Reinforce role of environmental police force.	- Contribution in developing and updating biodiversity laws, strategies, and action plans. - Encourage women to perform researches, conduct studies, and access national and international funds. - Acknowledge women access to local knowledge and know how.	Synergy with climate change in mitigation programs by using resilience genes.
20	76.2	1.7 Build capacities and involve local and indigenous communities in management programs of biodiversity protection and sustainable use of	Nagoya Protocol on Access and Benefit-sharing, Article 7	Access to traditional knowledge associated with genetic resources	- Take measures with the aim of ensuring that traditional knowledge associated	- Adopt regulations on exchanging biological resources including traditional	- Regulations on access to traditional knowledge associated with genetic resources Are not developed.	- Develop national regulations and adopt protocols on access to traditional knowledge associated	- Policy and national strategy of the Ministry of Social Development - The National Strategy for Agricultural Development	- Country Endorsement-Jordan Environmental information system (JEIS)	1.7 Awareness workshops. Media programs. Websites	- Capacity building of gender in strategies and technologies relevant to conservation and sustainable utilization of	Synergy with climate change in mitigation programs by using resilience genes.

Overall Rank and Score of Prioritized Biodiversity Research Topics		BIODIVERSITY Topics Prioritized (Policy-oriented *Research* Needed to Address National Gaps)*	Article or COP decision	Mandate	Provisions /main themes	Specific obligation to Jordan	National legislation gap (law/policy)	Policy-oriented research needed to address gaps	Specific research sub-guidelines	Specific research sub-procedures	Research Tools (if any)**	Gender Mainstreaming	Synergies
Overall Rank	Score												
		natural resource.			with genetic resources that is held by indigenous and local communities is accessed with the prior and informed consent.	knowledge associated with genetic resources that is held by indigenous and local communities		with genetic resources.	2002- 2010 (NSAD).	produced by RFP1, CB2 , 2011 on mechanism for collaboration between policy and research institutions in relations to Rio Conventions		biodiversity. - Carry out awareness campaigns and training programs in biodiversity conservation and sustainable utilization.	
13 31	77.8 72.8	1.4 Develop, adopt a policy instrument, and commence implementing an effective, participatory and updated national biodiversity strategy and action plan that copes with climate change 5.8 Understanding upland-lowland interactions and emphasizing the relevance of upland ecosystems for the management of food, water and soil resources	Nagoya Protocol on Access and Benefit-sharing Article 8	Special considerations	a. Create conditions to promote research which contributes to the conservation and sustainable use of BD, including through simplified measures on access for non-commercial research	- Promote researches on biodiversity conservation and sustainable utilization.	- Lack of strategy on genetic resources conservation, sustainable utilization and management.	- Develop national strategy on genetic resources conservation, sustainable utilization and management, and considering genetic resources exchange in the strategy.	- The National Strategy for Agricultural Development 2002- 2010 (NSAD).	- Country Endorsement.- Accreditation of the National Implementation Entity. - Inclusion of multidisciplinary team of researchers and research assistants.	- Jordan Environmental information system (JEIS). - Available efficient strategies. - CBD frequent reports.	- Gender empowerment in biodiversity workshops and media. - Manage and monitor gender equity. - Acknowledge women access to local knowledge and know how. - Gender empowerment in small and medium enterprises. - Gender empowerment in private	Synergy with climate change in mitigation programs by using resilience genes.

Overall Rank and Score of Prioritized Biodiversity Research Topics		BIODIVERSITY Topics Prioritized (Policy-oriented *Research* Needed to Address National Gaps)*	Article or COP decision	Mandate	Provisions /main themes	Specific obligation to Jordan	National legislation gap (law/policy)	Policy-oriented research needed to address gaps	Specific research sub-guidelines	Specific research sub-procedures	Research Tools (if any)**	Gender Mainstreaming	Synergies
Overall Rank	Score												
					purposes. c. Consider the importance of genetic resources for food and agriculture and their special role for food security							sectors and NGOs.	
9 18 38 41	78.8 76.4 69.4 68.0	2.10 Addressing the value of biodiversity and genetic resources on agricultural development and food security. 1.1 Utilization of genetic resources to mitigate impact of climate change and combat drought. 2.12 Domestication of local wild genetic resources 3.1 Characterization of biological content of arid and	Nagoya Protocol on Access and Benefit-sharing Article 9	Contribution to conservation and sustainable use	Encourage users and providers to direct benefits arising from the utilization of genetic resources towards the conservation of biological diversity and the sustainable use of its components.	- Encourage programs relevant to direct benefits arising from utilization of genetic resources.	- lack of uniform and integration between ministries, governmental research institutes, educational research institutes, NGOs and local communities	- Cooperate with NGO and private sector. - Networking with ministries, governmental research institutes, educational research institutes, NGOs and local communities	- The National Strategy for Agricultural Development 2002- 2010 (NSAD). - HCST prioritized research. - Frequent SBSTTA reports and recommendations.	- Country Endorsement.- Accreditation of the National Implementation Entity. - Inclusion of multidisciplinary team of researchers and research assistants.	2.10 G.M.E (genotype–management–environment) interactions. Workshops and field days to elaborate the lack of adaptation of improved varieties to heterogeneous and marginal production areas emphasis on wide rather	- Acknowledge women access to local knowledge and know how. - Gender empowerment in small and medium enterprises. - Gender empowerment in private sectors and NGOs.	Synergy with desertification in improving livelihood and poverty alleviation programs.

Overall Rank and Score of Prioritized Biodiversity Research Topics		BIODIVERSITY Topics Prioritized (Policy-oriented *Research* Needed to Address National Gaps)*	Article or COP decision	Mandate	Provisions /main themes	Specific obligation to Jordan	National legislation gap (law/policy)	Policy-oriented research needed to address gaps	Specific research sub-guidelines	Specific research sub-procedures	Research Tools (if any)**	Gender Mainstreaming	Synergies
Overall Rank	Score												
44 50	65.0 61.6	semiarid areas. 6.4 Enhance marine eco-tourism 3.10 Impact of water harvesting on biological diversity									than local adaptation.		
13	77.8	1.4 Develop, adopt a policy instrument, and commence implementing an effective, participatory and updated national biodiversity strategy and action plan that copes with climate change	Nagoya Protocol on Access and Benefit-sharing Article 10	Global Multilateral Benefit-sharing Mechanism	Consider the need for a global multilateral benefit-sharing mechanism to address the fair and equitable sharing of benefits derived from the utilization of genetic resources and traditional knowledge associated with genetic resources that occur in transboun	- Incorporate with the global multilateral benefit-sharing mechanism to address the fair and equitable sharing of benefits derived from the utilization of genetic resources and traditional knowledge	- Regulations on multilateral benefit-sharing mechanism not developed.	- Develop national regulations to cope with global multilateral benefit-sharing mechanism to address the fair and equitable sharing of benefits derived from the utilization of genetic resources and traditional knowledge	- The National Strategy for Agricultural Development 2002- 2010 (NSAD). - Frequent SBSTTA reports and recommendations. - The National Strategy for Agricultural Development 2002- 2010 (NSAD).	- Eligibility according to national priorities of the policy oriented research theme. - The international treaties like ITPGRFA	- Local communities, Indigenous knowledge, property rights office, Standard material Transfer agreement (SMTA)	- Acknowledge women access to local knowledge and know how. - Gender empowerment in small and medium enterprises. - Gender empowerment in private sectors and NGOs.	Synergy with desertification in improving livelihood and poverty alleviation programs.

Overall Rank and Score of Prioritized Biodiversity Research Topics		BIODIVERSITY Topics Prioritized (Policy-oriented *Research* Needed to Address National Gaps)*	Article or COP decision	Mandate	Provisions /main themes	Specific obligation to Jordan	National legislation gap (law/policy)	Policy-oriented research needed to address gaps	Specific research sub-guidelines	Specific research sub-procedures	Research Tools (if any)**	Gender Mainstreaming	Synergies
Overall Rank	Score												
					dary situations or for which it is not possible to grant or obtain prior informed consent.								
7 7 45	79.4 79.4 64.0	3.12 Enhancement the role of woman as a traditional leadership in the Bedouin society in biodiversity protection 3.13 Enhance medicinal and herbal production as supplementary income to poor communities. 2.4 Developing Agrobiodiversity phase II project (to follow up the outcomes of Agrobiodiversity phase I).	Nagoya Protocol on Access and Benefit-sharing Article 12	Traditional knowledge associated with genetic resources	- Consider indigenous and local communities' customary laws, community protocols and procedures with respect to traditional knowledge associated with genetic resources. - Support the development by indigenous and local communiti	- Incorporate indigenous and local communities' customary laws, community protocols and procedures with respect to traditional knowledge associated with genetic resources.	- Gender mainstreaming not properly covered in national policies	-Improve and maintain national policies to empower gender and consider the role of women as holder of traditional knowledge associated with genetic resources.	- The National Strategy for Agricultural Development 2002- 2010 (NSAD). - Frequent SBSTTA reports and recommendations. - The National Strategy for Agricultural Development 2002- 2010 (NSAD). - NBDAP, MoEnv.	- Country Endorsement - Inclusion of multidisciplinary team of researchers and research assistants. - Accreditation of the National Implementation Entity. - Enhance Initiating development and revising committees at the MoEnv.	3.12. Rapid rural appraisal for socioeconomic studies. Badia bench mark reports. Interview with rangeland residents, develop small enterprise outcomes. 3.13. Informant consensus factor (ICF). Ethno-botanical techniques. Interviews. Community chain analysis for	- Gender empowerment in small and medium enterprises. - Gender empowerment in private sectors and NGOs. - Acknowledge women access to local knowledge and know how. - Gender employment in small-scale economically feasible applications	- Synergy with desertification in improving livelihood and poverty alleviation programs. - Synergy with climate change in mitigation programs by using resilience genes.

Overall Rank and Score of Prioritized Biodiversity Research Topics		BIODIVERSITY Topics Prioritized (Policy-oriented *Research* Needed to Address National Gaps)*	Article or COP decision	Mandate	Provisions /main themes	Specific obligation to Jordan	National legislation gap (law/policy)	Policy-oriented research needed to address gaps	Specific research sub-guidelines	Specific research sub-procedures	Research Tools (if any)**	Gender Mainstreaming	Synergies
Overall Rank	Score												
					es, including women within these communities.						medicinal and herbal plants. Marketing analysis and demand. Small enterprise outcomes from dry and fresh production.		
* The numbers used are the same of those mentioned in Table results of the stake-holders evaluation. ** The numbers refer to the tools identified for research (if applicable) of prioritization.													

2.5. Potential Funding Sources for Rio Conventions-related Research

The Rio Conventions emphasized the need for research and to put research to use in ameliorating the effects of climate change, to reduce loss of biodiversity, and to abate the rate of desertification. The Rio Conventions also require that research be translated into specific actions wherever possible. Each country is expected to allocate adequate resources in accordance with their financial circumstances to carry out the research needed to understand and mitigate impacts resulting from desertification, loss of biodiversity and climate change. At the present time, there is no dedicated financial mechanism to fund research related to the Rio Conventions in Jordan. However, the 2011 final report of RFP1 of CB-2 Project (RFP 2010 /12 titled: "A Study on Potential Institutional Mechanism for Future Collaboration Between Policy and Research Institutions in Relation to Rio Conventions" lists some internal funding sources and opportunities for research that are summarized in Table 10.

The report also commented that the role the private sector plays today in natural resources management in Jordan is very limited. However, the private sector could potentially have an important role, especially in resource mobilization. The Jordan Companies Law No. 22 (1997) and its amendments requires public shareholder company to allocate a fixed percent of its benefits to support universities, scientific research, and professional training. Such allocation could be an opportunity to fund research related to the implementation of the three conventions. Another source of funding may be private companies that allocate funds to benefit communities in the areas of health, environment, poverty alleviation, etc. Examples on these companies are Jordan Phosphate Mines Company, HSBC Bank, Arab Potash Company and Jordan Petroleum Refinery Company.

There are numerous opportunities for funding from international sources for the three Rio Conventions' thematic areas. However, there are often many stipulations on funds that are available. Table 11 lists the types of funding available from various agencies, institutions, foundations, and trusts. Subject areas, funding cycles, application deadlines, and proposal guidelines change frequently, so interested parties are encouraged to check frequently for these and additional opportunities. There are several websites that collate and list potential sources of funding. The following are two that provide good listings for the Rio Conventions' themes.

The Terra Viva Grants Directory develops and manages information about grants for agriculture, energy, environment, and natural resources in developing countries. The website contains profiles of over 400 grant makers and has information on application procedures and deadlines.

http://www.terravivagrants.org/Home

The Climate Funds Update is an independent website that provides information on the growing number of international climate finance initiatives.

http://www.climatefundsupdate.org/

TABLE 10: POTENTIAL DOMESTIC FUNDING SOURCES FOR CLIMATE CHANGE, DESERTIFICATION, AND BIODIVERSITY STUDIES [THEMATIC AREAS ARE: BIODIVERSITY (BD), CLIMATE CHANGE (CC), AND COMBAT DESERTIFICATION (CD)].

Funding Sources	Area	Main Focus	Related Research Areas	Targets	Maximum Grant Size	Website
The Higher Council for Science and Technology (HCST)	BD, CC, CD	Improve practical research areas for developing the country	National research and development priorities	Jordanian Researchers	Up to 1,000,000 JD	http://hcst.gov.jo/
Scientific Research Support Fund/Ministry of Higher Education	BD, CC, CD	The fund aims to develop human research resources and infrastructure in a bid to boost the country's competitive environment in ecological, water, and tech applications domains.	Management of bioecosystems, conservation of endangered genetic resources, desertification control and drought mitigation, impacts of climate change on water and environment	academic staff and graduate research students		http://www.mohe.gov.jo/Mohe/tabid/36/language/en-US/Default.aspx
Deanships of Academic Research at Universities	BD, CC, CD	The mission of DARs is to promote, facilitate the development of academic research, encourage, coordinate, regulate as well as support in all means the different kinds of research.	Emphasis on areas of national interest and priority, e.g. energy, renewable energy and water.	academic staff and graduate research students		
The Hashemite Fund for Development of Jordan Badia	BD, CC, CD	The mission of HFDJB is to establish sustainable development in the Jordan Badia through active participation of the local communities and the implementation of environmental, social and economic activities, while maintaining and respecting the prevailing culture and habits.	Funds research to combat land degradation and conserve biodiversity in Badia as well as studies on the potential impact of climate change on land resources.	Jordanian Researchers		http://www.badiafund.gov.jo/en
Environmental Protection Fund	BD, CC, CD	Goals of the EPF are to (a) secure funds to support the government's environmental, social and economic policies; and (b) stimulate MoEnv investment in the environmental sector in Jordan	Research activities may be funded either directly or through implementation projects that contain research components.	Jordanian Researchers		

Table 11: Potential international funding sources for Climate Change, Desertification, and Biodiversity studies [thematic areas are: Biodiversity (BD), Climate Change (CC), and Combat Desertification (CD)].

Funding Sources	Area	Main Focus	Related Research Areas	Targets	Maximum Grant Size	Website
Abercrombie & Kent Global Foundation (A&KGF)	CC, BD, CD	The A&KGF supports projects throughout the world in four key areas: general conservation; community conservation education; wildlife preservation and research; and historical monument protection.				http://www.akglobalfoundation.org/
Academy of Sciences for the Developing World (TWAS) -- Grants for International Meetings.	CC, BD, CD	TWAS makes grants to support the organization of high-level international and regional scientific activities in developing countries by offering financial assistance for conferences, workshops, symposia, and special meetings held in these countries.				http://twas.ictp.it/prog/meetings/support-for-international-scientific-meetings
Alexander von Humboldt Foundation	CC, BD, CD	The Foundation supports foreign students, academics, and doctoral candidates during their stay in Germany and it promotes academic cooperation between German scientists and scholars from abroad.	Research fellowships and research awards allow researchers to come to Germany to work on a research project together with a host and collaborative partner.			http://www.humboldt-foundation.de
American Association for the Advancement of Science (AAAS)	CC, BD, CD	AAAS International Initiatives support three strategic goals, which serve to promote: international scientific cooperation; capacity-building and workforce enhancements; and sustainable development.				http://www.aaas.org/
Andrew W. Mellon Foundation	CC, BD, CD	The Foundation makes grants in higher education, museums and art conservation, performing arts, conservation and the environment, and scholarly communications and Information Technology.	supports initiatives with long time horizons		over $200 million USD awarded each year	http://www.mellon.org/
BBVA Foundation -- Awards in Frontiers of Knowledge	CC	The BBVA Foundation awards recognize innovative and fundamental advances in several areas of science, culture, and collaboration.	Thematic areas include ecology and conservation biology; climate change; and development cooperation.	Individuals and organizations of any nationality.		http://www.fbbva.es/TLFU/tlfu/esp/microsites/premios/fronteras/index.jsp
BiodivERsA European Biodiversity Observation Network	CC, BD, CD	BiodivERsA encourages researchers working in different countries to pursue projects on an international rather than national scale. The network provides the funding, focus and networking opportunities for biodiversity researchers to work efficiently on a variety of projects.	Biodiversity dynamics; innovative solutions for the use, conservation and sustainable management of biological resources.			http://www.biodiversa.org/

Funding Sources	Area	Main Focus	Related Research Areas	Targets	Maximum Grant Size	Website
BP Conservation Program	BD	The BP Conservation Program offers awards to teams that have been identified with leadership potential for biodiversity conservation and are developing their skills through small scale practical conservation projects.			$12,500 USD	http://www.conservationleadershipprogramme.org/
Cargill Corporate Giving	BD, CD	Cargill supports programs to ensure a safe food supply and demonstrate responsible stewardship of natural resources.		regional, national and global nonprofits and NGOs	over $200 million USD awarded each year	http://www.cargill.com/corporate-responsibility/community-engagement/charitable-giving/corporate-giving/index.jsp
Conservation and Research Foundation	CC, BD, CD	The Foundation awards seed money to promote conservation and enlightened use of renewable natural resources; encourage related research in the biological sciences; deepen understanding of the relationships between man and the environment; and address the problem of overpopulation.	supports investigations that might be ineligible for funding from conventional sources	organizations and individuals	$5,000 USD	http://conservationresearch.wordpress.com/
Conservation International (CI)	BD	Conservation International is a corporation that applies innovations in science, economics, and policy and community participation to protect plant and animal diversity. Its mission is to conserve the Earth's living heritage, global biodiversity, and to demonstrate that human societies are able to live harmoniously with nature.	provide strategic, financial, and technical support,	governments, nonprofit organizations, universities, businesses, and local communities		www.conservation.org/
Conservation, Food, & Health Foundation	BD	The Conservation, Food and Health Foundation supports programs in three primary fields of interest: conservation, food, and health. Conservation grants help improve ecological and environmental conditions in the developing world.	field research, technical assistance that help conserve ecosystems and protect biological diversity, technical and scientific training in conservation and protection of resources	organizations located in developing countries or developed country organizations whose activities are of direct and immediate benefit to developing countries	generally $25,000 USD or less	http://cfhfoundation.grantsmanagement08.com/
Critical Ecosystem Partnership Fund (CEPF)	CC, BD, CD	A joint initiative between Conservation International, The Global Environment Facility, the MacArthur Foundation and the World Bank. Supports projects such as managing of protected areas and coordinating biodiversity corridors; training; trans-boundary planning; priority setting and consensus building; strengthening indigenous organizations; and facilitating partnerships between the private	target direct global environmental benefits	small organizations to international organizations		http://www.cepf.net/Pages/default.aspx

Funding Sources	Area	Main Focus	Related Research Areas	Targets	Maximum Grant Size	Website
		sector and protected areas.				
Darwin Initiative: Conservation Research and Capacity Building	BD	The Darwin Initiative funds partnerships between UK institutions and institutions in developing countries for biodiversity conservation and sustainable use of resources.	Capacity building, training, research, projects to implement the Biodiversity Convention, and environmental education and awareness.			http://darwin.defra.gov.uk/
David and Lucile Packard Foundation	International	Objectives are to stimulate sustainable production processes, while conserving biodiversity and support grassroots level initiatives with active role in international lobby and advocacy.		International, national, or regional organizations	1.8 million € supports on average 17 projects per year.	http://www.packard.org/
Deutsche Gesellschaft Internationale Zusammenarbeit (GIZ)	BD, CC	GIZ projects include economic development; governance and democracy; security, reconstruction, food security, health and basic education; and environmental protection, resource conservation and climate change mitigation.				(http://www.giz.de/en/home.html
Dubai International Award for Best Practices (DIABP)	CC, BD, CD	The DIABP was established to recognize the best practices with positive impact on improving the living environment. These include successful initiatives which 1) have a demonstrable and tangible impact on improving people's quality of life; 2) are the result of effective partnerships between the public, private and civic sectors of society; and 3) are socially, culturally, economically and environmentally sustainable.				http://dubai-award.dm.gov.ae
Earthwatch Institute	CC	Earthwatch supports long-term scientific field research that tackles the world's most pressing environmental problems. Every year Earthwatch awards grants of over £3.8 million (US $6 million) in support of as many as 70 research projects around the world.	Ecosystem services, climate change, oceans, and cultural heritage		average about $85,000 USD	http://www.earthwatch.org/

Funding Sources	Area	Main Focus	Related Research Areas	Targets	Maximum Grant Size	Website
Energy Globe Award for Sustainability	CC, BD, CD	The Energy Globe Award is for projects that conserve and protect natural resources, or that employ renewable energy.		individuals, organizations, NGOs, government agencies	10000	http://www.energyglobe.com/en/award-participation/
Environmental Protection Fund	CC	Carbon trading via the Clean Development Mechanism (CDM), through the selling of polluting rights of greenhouse gases to international governments and companies	Sustainable use of natural resources.	private sector	No limit	
European Commission (EC) -- Water Management in the Mediterranean.	CC	Focus areas are water governance; water and climate change; water financing; water demand management and efficiency; municipal waste; municipal wastewater; and industrial emissions.		NGOs, government entities, and institutes and universities in EU countries and ENPI-South countries (includes Jordan).		http://www.semide.net/thematicdirs/news/2011/03/call-demonstration-projects-sustainable-water-integrated-management
European Tropical Forest Research Network (ETFRN)	CC, BD, CD	ETFRN is a forum for communication between European organizations, researchers, EU institutions and others concerned with tropical and subtropical forest research. ETFRN is not a funding organization but they provide links to funding relevant information. ETFRN provides easy access to relevant web-based information on topics such as climate change; forests and water; biodiversity; etc.	Promotes conservation and wise use of forests and woodlands in tropical and subtropical countries.			http://www.etfrn.org/etfrn/
Foundation Ensemble	CC, BD, CD	Foundation Ensemble supports individuals that implement innovative projects in developing countries to reconcile the fight against poverty with environmental protection.		small NGOs, and other non-profit organizations		http://www.fondationensemble.org/concourira.php
Ford Foundation	CC, BD, CD	The Ford Foundation is working to address flawed policies that can limit poor people's access to the natural resources they depend on and can foster land speculation and conflict. Grants support research, advocacy, networking among organizations and communications to increase awareness and training activities plus promoting socially just climate change policies that meet the needs of the rural poor.	Projects to reduce the rate of consumption of natural resources and/or pollution, protection of the natural environment, projects aimed at creating or increasing environmental awareness.	research centers, universities, NGOs, international and national organizations, researchers		http://www.fordfound.org/
French Agricultural Research Center for International Development	CC, BD, CD	CIRAD is a French agricultural research center working with environmental issues, natural resource management, and the main global issues concerning agriculture.	research and trials, training, dissemination of information, innovation and appraisals	research centers, universities, international organizations, researchers	budget of 214 million € in 2010	http://www.cirad.fr/

Funding Sources	Area	Main Focus	Related Research Areas	Targets	Maximum Grant Size	Website
French Foundation for Biodiversity Research	BD	The FRB funds proposals in biodiversity research. Projects at FRB are led by French institutions, and are open to international participation.		research centers, universities, international organizations, researchers		http://www.fondationbiodiversite.fr/
French Global Environment Facility	CC, BD	The FGEF supports and promotes the protection and conservation of the global environment in developing and transition countries. Majority of total project funding should be from other sources (including locally).	biodiversity, climate change, international waters, land degradation, desertification and deforestation	international, national, regional, and local institutions	Average grant >1 M€ & averaged about 12% of total project cost	http://www.ffem.net
G. Unger Vetlesen Foundation: Research Grants	CC	The G. Unger Vetlesen Foundation makes grants for marine and ocean conservation, earth sciences, climate change, and wildlife management. Most grant recipients have their principal offices in the USA. Grants range from		educational and scientific institutions, and a few conservation NGOs	$10,000 to over $1 M USD	http://www.monellvetlesen.org/vetlesen/default.htm
GEF & UNDP Small Grants Program (SGP)	CC, BC, CD	The Global Environment Facility's Small Grants Program aims to deliver global environmental benefits in the GEF Focal Areas of biodiversity conservation, climate change mitigation, protection of international waters, prevention of land degradation (primarily desertification and deforestation), and elimination of persistent organic pollutants through community-based approaches.		research centers, universities, NGOs, international and national organizations, researchers		http://sgp.undp.org/
GEF Trust Fund - Climate Change Focal Area	CC	The Global Environment Facility (GEF) Climate Change area objective is to help developing countries and in transition to contribute to the overall objective of the UNFCCC. The fund does not support strictly research projects, but may support projects that have a research component.	Measures that minimize climate change damage by reducing the risk, or the adverse effects, of climate change.			http://www.climatefundsupdate.org/listing/gef-trust-fund
Global Biodiversity Information Facility: Research in Biosystematics	BD	The Global Biodiversity Information Facility administers the Ebbe Nielsen Prize awarded to a promising researcher who combines biosystematics and biological diversity informatics.		Researchers	$30,000 USD	http://www.gbif.org/communications/news-and-events/ebbe-nielsen-prize/
Idea Wild: Equipment in Support of Conservation Research	BD	Idea Wild provides equipment and supplies in support of biodiversity conservation in developing countries		Individuals of any nationality	$1,500 USD	http://www.ideawild.org/

Funding Sources	Area	Main Focus	Related Research Areas	Targets	Maximum Grant Size	Website
Information Climate Initiative	CC	The German Federal Environment Ministry supports climate protection projects in developing countries through the International Climate Initiative.	support climate protection measures, improving adaptability to the consequences of climate change and conserving and using climate-relevant areas which merit protection			http://www.bmu-klimaschutzinitiative.de/en/news
InnoCentive -- Communications from Communities About Climate Change.	CC	In collaboration with the World Resources Institute, InnoCentive makes awards for the best ideas on communication platforms that connect communities with public and private organizations regarding community problems related to climate change.			$1,000 to $10,000 USD	https://www.innocentive.com/ar/challenge/overview/9932695
International Climate Initiative (Previously known as the International Climate Protection Initiative)	CC, BD	The International Climate Initiative (ICI) finances climate projects in developing and newly industrialized countries, as well as countries in transition economies. The ICI focuses on promoting a climate-friendly economy, measures for climate change adaptation and for the preservation or sustainable use of carbon reservoirs/Reducing Emissions from Deforestation and Forest Degradation (REDD)		in developing and newly industrialized countries, as well as countries in transition economies		http://www.bmu-klimaschutzinitiative.de/en/news
International Development Research Center: Research Grants and Fellowships	BD, CC	The IDRC provides funding for applied research from developing countries and Canada. IDRC makes grants for biodiversity and genetic resources; needs of the poor who live in degraded and fragile ecosystems; adaptation to climate change; and several other themes related to conservation.		researchers		http://www.idrc.ca/en/ev-54473-201-1-DO_TOPIC.html
International Foundation for Science: Research Grants for Young Professionals	BD	IFS makes grants to young scientists attached to universities, national research institutions, and research-oriented NGOs in developing countries. Normally, over 250 new grants are made each year in a large number of eligible countries in Asia, Africa, the Middle East, and Latin America.	Thematic areas include biodiversity and conservation; agriculture and food sciences; water and soil resources; forestry; natural products; marine resources; animal husbandry; and several others.	Scientists at the beginning of their research careers		http://www.ifs.se/

Funding Sources	Area	Main Focus	Related Research Areas	Targets	Maximum Grant Size	Website
International Foundation of Science (IFS)	CC, BD, CD	IFS is a research council with international operations and the mission to build the scientific capacity of developing countries in sciences related to the sustainable management of biological and water resources.	Can be used to purchase basic tools needed to conduct a research project: equipment, expendable supplies, and literature.	young developing country scientists	$12,00 USD (may be renewed twice)	http://www.ifs.se/
J.R.S. Biodiversity Foundation: Research on Biodiversity Informatics	BD	The J.R.S. Biodiversity Foundation supports projects that focus on collecting, synthesizing, and disseminating biodiversity data. The focus is biodiversity informatics, and technology approaches for collecting and interpreting biological information.		nonprofit institutions	>$1000,000 USD	http://www.jrsbdf.org/v3/home.asp
Japanese International Cooperation Agency	CC, BD, CD	The JICA works to promote economic and social development in developing countries. JICA works through technical cooperation projects, trainee programs, development studies, grant aid, emergency relief disaster, citizen participation and follow-up participation.	JICA topics include: governance; gender, women in developing countries; poverty reduction; environmental management; natural environment conservation; education; water, energy, mining, economic policy	JICA conducts assessments with the government of the partner country		http://www.jica.go.jp/english/index.html
Kuwait Foundation for the Advancement of Sciences	CC, BD, CD	KFAS Goal is to promote scientific, technological and intellectual progress within the State of Kuwait and the region. Supports research in basic and applied sciences	The Environmental Research Program focus is on environmental sustainability, conservation, and management of biodiversity.	regional and national researchers and institutions		http://www.kfas.org
Lawrence Foundation	CC, BD, CD	The foundation is focused on making grants to support environmental, education, health, human services and other causes. Both program and operating grants are made. They do not have any geographic restrictions on our grants.		researchers	average award about $12,000 USD	http://www.thelawrencefoundation.org/
Leverhulme Trust	CC, BD, CD	The Trust makes awards for the support of research and education. It emphasizes individuals and encompasses all subject areas. Awards provide financial support for innovative and original research projects of high quality and potential, the choice of theme and the design of the research lying entirely with the applicant.	The grants provide support for the salaries of research staff engaged on the project, plus associated costs directly related to the research proposed.	Universities in the UK and countries where, in the opinion of the Trust Board, the provision of research funding is seriously limited.	£250,000 over 2-3 years typical. Some funded for £250,000 to £500,000 for a period of up to 5 years	http://www.leverhulme.ac.uk/

Funding Sources	Area	Main Focus	Related Research Areas	Targets	Maximum Grant Size	Website
Lindbergh Foundation.	CC, BD, CD	The Charles A. and Anne Morrow Lindbergh Foundation makes grants for research and education in agriculture, conservation of natural resources, waste minimization, and other themes.		Citizens of all countries are eligible to apply.	$10,00 USD	http://www.lindberghfoundation.org/docs/index.php/our-grants
Man and the Biosphere Program (MAB)/ Young Scientists Awards	BD	MAB provides awards in support of research on ecosystems, natural resources and biodiversity. The program is focused on the management or preservation of the environment and successful management of biosphere reserves.	fund offers access for young scientists (especially women) to advanced research facilities	young researchers	$5,000 USD	http://www.unesco.org/new/en/natural-sciences/environment/ecologicalsciences/man-andbiosphere-programme/awards-and-prizes/
Mava Foundation: Conservation Research and Capacity Building (West Africa and Mediterranean)	BD	The Mava Foundation for Nature makes grants for research, training, and integrated management to maintain the biodiversity of terrestrial and aquatic ecosystems. Its funding priorities for the developing world are the Mediterranean Basin and the coastal zone of West Africa.		international, national, regional, and local institutions		http://www.mava-foundation.org/index.html
Max and Anna Levinson Foundation	BD	Funds grants to develop a more ecological sustainable world, in which people have a greater ability and opportunity to determine directions for the future.	Funding to the environment includes protection of ecosystems and biological diversity; alternative energy and conversion from the oil economy; alternative agriculture and local green economic development	individuals and groups	$10,000 to $20,000 USD	http://www.levinsonfoundation.org
McArthur Foundation Conservation and Sustainable Development	CC, BD, CD	Broad range of topics including conservation across large landscapes and seascapes and building local institutional capacity in government and civil society for biodiversity conservation.			$50,000 to $1,500,000 USD	http://www.macfound.org/site/c.lkLXJ8MQKrH/b.3599935/k.1648/John_D__Catherine_T_MacArthur_Foundation.htm
Mohamed bin Zayed Species Conservation Fund: Wildlife Research and Conservation	BD	The Fund provides grants for species conservation; to recognize leaders in the field of species conservation; and to elevate the importance of species in the conservation debate.	Supports projects focused on all kinds of plant and animal species.	organizations and individuals	up to $25,000 USD	http://www.mbzspeciesconservation.org/
National Geographic Society Conservation Trust	CC, BD, CD	The Fund supports conservation projects and individuals who significantly contribute to preservation and sustainable use of the Earth's biological, cultural and historical resources.			$15,000 to $20,000 USD	http://www.nationalgeographic.com/explorers/grants-programs/conservation-trust/

Funding Sources	Area	Main Focus	Related Research Areas	Targets	Maximum Grant Size	Website
National Geographic Society: Grants for Conservation Field Studies	CC, BD, CD	The National Geographic Society awards several hundred grants each year for exploration, research, and conservation. The Society's grant-making programs support work in wildlife conservation, ecology, marine biology, sustainable agriculture, and other environmental themes.		various	$12,000 to $20,000 USD	http://www.nationalgeographic.com/field/grants-programs/
National Oceanic and Atmospheric Administration (NOAA) Climate Program Office	CC	NOAA conducts and supports climate research, observations, modeling, information management, assessments, interdisciplinary decision support research, outreach, education, and stakeholder partnership development	funds high-priority climate science, assessments, decision support research, outreach, education, and capacity-building activities	universities, non-profits, scientific and research firms, research labs	$50,000 and $200,000 per year	http://www.climate.noaa.gov/opportunities/
NATO - Science for Peace and Security (SPS) Program	CC, BD, CD	The SPS Program supports practical scientific and technical cooperation among scientists and experts from NATO and its partners. The SPS offers grants to scientists in NATO partner and Mediterranean Dialogue countries (Jordan is among these countries) to collaborate on priority research topics.	energy security, environmental issues, management of water and non-renewable resources, desertification, land erosion, sustainable development,			http://www.nato.int/science
Natural Sciences and Engineering Research Council (NSERC)	CC, BD, CD	A number of international opportunities are available through NSERC grant and scholarship programs, or are facilitated through agreements with other research funding organizations in Canada and in other countries. NSERC has invested basic research, projects involving partnerships between postsecondary institutions and industry, and the training.		Canadian institutions and researchers, plus special funds to international researchers and institutions.		http://www.nserc-crsng.gc.ca/
NSF - Systematics and Biodiversity Science Cluster	BD	The Systematics and Biodiversity Science Cluster supports research that advances understanding of the diversity, systematics, and evolutionary history of organisms in natural systems.	biodiversity discovery			http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=503618
OPEC Fund for International Development	CC, BD, CD	The fund, provides grants in support of technical assistance, food aid, research, and contributes to the resources of other development institutions whose work benefits developing countries,	sustainable development is a priority	universities, institutions, and researchers	typically up to $100,000 USD per year	http://www.ofid.org/
Peoples Trust for Endangered Species: Wildlife Research, Conservation, Education	BD	The Peoples Trust for Endangered Species takes on a range of projects for endangered and threatened species and their habitats in the UK and worldwide.	Surveys and research of endangered wildlife; applied conservation in the field; and environmental education.	Scientific researchers and conservation workers in the UK and internationally	£2,000 to £10,000	http://www.ptes.org/

Funding Sources	Area	Main Focus	Related Research Areas	Targets	Maximum Grant Size	Website
Pro Natura Fund: Wildlife Research and Conservation	BD	The Pro Natura Fund grants include survey research in support of species conservation; ecological research; research on alien species; wildlife research; and dissemination of environmental knowledge (books, websites, etc.).		Applications from outside Japan need to be recommended by a scientist or environmental group in Japan	¥50,000 to ¥150,000	http://www.nacsj.or.jp/pn/
Ramsar Small Grants Fund	BD, CD	The Ramsar Small Grants support projects in wetlands conservation and wise use in developing countries.		Individuals, government agencies, and NGOs.	$40,000 USD	http://www.ramsar.org/cda/ramsar/display/main/main.jsp?zn=ramsar&cp=1-63-68-159_4000_0__
Rockefeller Foundation	CC	The Rockefeller Foundation is a knowledge-based, global foundation with a commitment to enrich and sustain the lives and livelihoods of poor and excluded people throughout the world.	Climate change and its effects on developing countries	organizations and researchers	Various	http://www.rockefellerfoundation.org/
Royal Geographical Society: Grants for Conservation Field Studies	CC	The Royal Geographical Society makes grants for geographical research, fieldwork, and teaching. Grant themes are essentially all aspects of natural history, the physical world, and interactions with human populations.	Ecological surveys; studies of particular environments; climate change; and others.	Individuals (most grants go to UK nationals, Society members, and/or students registered at UK universities)	£500 to £15,000	http://www.rgs.org/HomePage.htm
Rufford Foundation	BD, CD	The Rufford Foundation is an independent grant-making trust based in the UK. The Foundation concentrates its funding on nature conservation projects in developing countries.		small to medium-sized organizations	£20,000 to £30,000	http://www.rufford.org/
SeaWorld and Busch Gardens Conservation Fund: Wildlife Research and Conservation	BD	The SeaWorld and Busch Gardens Conservation Fund is a nonprofit charitable organization for wildlife conservation. The Fund focuses on international species research; habitat protection; animal rescue and rehabilitation; and conservation education.		nonprofit organizations and accredited universities and research centers	$15,000 to $25,000 USD	http://www.swbg-conservationfund.org/
Swedish Research Links Program (SIDA)	CC, BD, CD	The Swedish Research Links Program seeks to foster research ties between researchers in Sweden with researchers in Asia, the Middle East and North Africa region (MENA), and other countries. Researchers from the countries involved must submit joint applications on projects of mutual interest. Research Grants are normally awarded for three years) and Planning Grant are one year. Funding is awarded for both basic and applied research.	The long-term goal is to contribute to mutual scientific and socioeconomic development of the countries involved through funding of collaborative research projects of high scientific quality and mutual relevance.	Joint application with Swedish researchers		http://www.sida.se/English/

Funding Sources	Area	Main Focus	Related Research Areas	Targets	Maximum Grant Size	Website
Swiss Agency for Development and Cooperation (SDC)	CC	SDC's development cooperation activities aim at building sustainability in developing countries so that countries can be helped to help themselves.	climate change and environment	public and private partners		http://www.sdc.admin.ch/
The Deutsche Forschungsgemeinschaft (DFG)	CC, BD, CD	The DFG (German Research Foundation) promotes research in all fields of science and the humanities. Scientific and academic excellence, for the advancement of young researchers. Interdisciplinary and internationality are key elements in the work of DFG.		young researchers		http://www.dfg.de/
The German Academic Exchange Service (DAAD)	CC, BD, CD	The DAAD supports the international exchange of students and scholars. Funding programs are open to scholars from all disciplines and countries in the world for either visits to or from Germany.		scholars from all disciplines and countries		http://www.daad.de/
The International Development Research Center (IDRC)	CC	IDRC supports research in developing countries to promote growth and development. The IDRC funds research focused on reducing poverty and creating equitable access to resources and services. The applied research funded directly addresses existing or emerging problems in developing countries	Climate Change, Water, Ecosystems, Environmental Economics, Water Demand and Management	Researchers		http://www.idrc.ca
The Islamic Development Bank	CC, BD, CD	The Islamic Development Bank fosters economic development and social progress of member countries and Muslim communities individually as well as jointly in accordance with the principles of Shari'ah (Islamic Law). The Bank has equity capital and grant loans for projects and enterprises and provides financial assistance to member countries for economic and social development.		Associations, governments		http://www.isdb.org/
Toyota Motor Corporation -- Toyota Environmental Activities Grants Program.	CC, BD	The themes are biodiversity conservation and measures to counter global warming.		open to applicants in Japan, and international partners in collaboration with Japanese groups		http://www.toyota-global.com/sustainability/corporate_citizenship/environment/toyota_environmental_activities_grant_program/
U.S. Agency for International Development -- MENA Water Grants.	CC, BD, CD	USAID-MENA has Water Grants Program for training, applied research, and information dissemination to transform water policy, management, and capabilities within the Middle East and North Africa.				http://www.grants.gov/search/search.do?mode=VIEW&oppId=92473

Funding Sources	Area	Main Focus	Related Research Areas	Targets	Maximum Grant Size	Website
U.S. Agency for International Development -- Biodiversity and Infrastructure Development ("BUILD").	BD	USAID funds programs to develop and test approaches in the policy, regulatory, and planning realm to reduce the threat of infrastructure development to high-biodiversity ecosystems.				http://www.fundsforngos.org/latest-funds-for-ngos/usaid-funding-opportunity-biodiversity-understanding-infrastructure-landscape-development-program/
UK Darwin Initiative.	BD	The UK Department for Environment, Food, and Rural Affairs makes grants for biodiversity research in support of three international conventions				http://darwin.defra.gov.uk/apply/main/
UNDP Program of Work on Protected Areas	CC, BD, CD	The PoWPA is a global action plan to establish comprehensive, effectively managed and sustainably funded protected area networks in each country. In order to support improved implementation, a number of international conservation NGOs, UN agencies, and the GEF agreed to develop a program to provide targeted financial assistance for PoWPA implementation.				http://www.protectedareas.org/
United Nations Educational, Scientific, and Cultural Organization: Grants and Fellowships in Conservation Science	BD	UNESCO's Natural Sciences Sector offers grants, fellowships, and prizes related to environment and conservation. They include the Man and the Biosphere (MAB) Young Scientists Awards, together with several other categories of awards.	Research on ecosystems, natural resources, and biodiversity.	junior and senior scientists	$5,000 USD	http://portal.unesco.org/science/en/ev.php-URL_ID=5879&URL_DO=DO_TOPIC&URL_SECTION=201.html
United Nations Framework Convention on Climate Change - Adaptation Fund	CC, BD, CD	The Adaptation Fund makes grants for projects and programs that address the adverse impacts of, and risks posed by, climate change. Themes include measures to increase resilience against the threats of droughts, flooding, coastal erosion, etc., and the negative impacts they cause for agriculture, fisheries, water supply, and related aspects of community livelihoods.	Eligibility for grants extends to countries which are party to the Kyoto Protocol, with emphasis on developing countries that are particularly vulnerable to the adverse effects of climate change.	government organizations that include national ministries, development institutes, local governments		http://www.adaptation-fund.org/
Volkswagen Foundation	CC, BD, CD	The Volkswagen Foundation provides financial support to academic institutions in Germany, as well as other countries, and funding is available for projects in all disciplines. Another important part of its mission is to provide support for aspiring young academics, promote international exchange and to enhance the structural conditions for research and higher education.		young researchers		http://www.volkswagenstiftung.de/index.html?L=1

Funding Sources	Area	Main Focus	Related Research Areas	Targets	Maximum Grant Size	Website
Wallace Global Fund (WGF)	CC, BD, CD	The Fund supports activities at the global and national level, and considers significant local or regional initiatives offering the potential to leverage broader national or global impact. Both one-year and multi-year grants.	natural resource	research institutions	$50,000 USD average, range from $2,000 to $400,000 USD.	http://www.wgf.org/about
Whitley Laing Foundation	CC, BD	Wide range of awards for nature conservation projects worldwide. They have the common aim of promoting the benefits of wildlife and habitat conservation to the local communities in which applicants work. The Foundation also seeks to raise public awareness of the serious problems facing ecosystems.			up to £30,000	http://www.whitleyaward.org/
Wildlife Conservation Society: Wildlife Research and Conservation	CC, BD, CD	The WCS engages in science, conservation, education, and the support of zoos and aquariums for the protection of wildlife and wild lands worldwide. WCS is a partner in the Conservation Leadership Program, and it also sponsors small grants in the form of research fellowships.	Research projects support the WCS conservation priorities.	Students from developing countries enrolled in a masters, PhD, or DVM program	$20,000 USD	http://programs.wcs.org/Default.aspx?alias=programs.wcs.org/grants
World Bank	BD	The World Bank makes grants for forest sustainability, conservation of critical ecosystems, and related protection and management of biodiversity and natural resources.	Projects to support the Biodiversity Convention and global warming areas include adaptation, mitigation, and capacity building.			http://wbi.worldbank.org/wbi/topic/climate-change
World Bank Small Grants Program	CC, BD, CD	Activities supported by the Small Grants Program promote dialogue and dissemination of information about international development. These activities are most often conferences and seminars, special publications, audio-visual materials, or other innovative networking efforts that small organizations generally find difficult to fund through their regular program budgets.	environmental protection,	Program prefers to support nonprofit, nongovernmental, nonacademic organizations	$10,000 to $15,000 USD	http://www.vetiver.com/TVN_vetfund4.htm

2.6. Policy-Oriented Research Synergies

Synergy is formally defined as the combined effect of several components of a system that exceeds the sum of individual effects. In the context of the Rio Conventions synergy is achieved when efforts of governmental agencies, NGOs, academic institutions, the private sector and other sectors of society are utilized together to achieve a particular objective. In order to implement the environmental agreements developed as a result of the Rio Earth Summit: Conventions on Biological Diversity, Climate Change, and

Desertification, countries must develop specific implementation mechanisms and fulfill obligations involving reporting, training, public education, and other activities. These obligations can create a great burden both in terms of financial and human resources upon countries. Overlapping and sometimes duplicate commitments can produce challenges, confusion, and waste of resources.

The need for a synergetic approach and for finding ways to coordinate and harmonize overlapping activities has been well documented by Mouat et al. (2006). They recognized that the main objectives of these agreements are well interrelated as climate change can affect desertification and biodiversity due to increased occurrence of extreme events such as droughts and floods and shifts in the distribution of temperature and precipitation. Desertification on its turn, affects biodiversity by reducing the diversity of vegetation cover and soil microbial species leading to reduced soil conservation and soil erosion. Consequent reduction of carbon stocks and above and below ground sequestration together with land use changes can lead to further climatic change. The combination of these effects can result in a reduction of ecosystems functions and services that on its turn would lead to an increase in poverty. Although this is an over simplification of complex interactions and processes that may take place in the environment, it serves well the purpose of justifying synergy among national and local institutions in charge of activities related to each convention, achieving a combined effect and greater benefits.

Research priorities and activities should be established with these interactions in mind. Even if a research project aims at solving a specific problem related to one of the conventions it should be designed with the big picture in mind and aim at contributing to the system described in Figure 1.

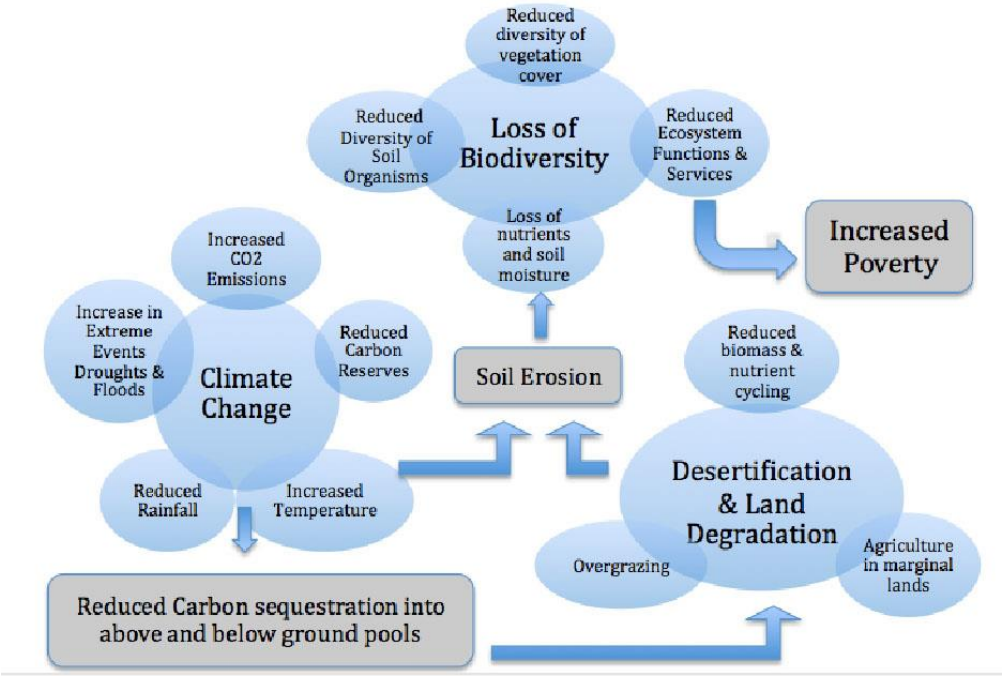

FIGURE 1: BASIC RELATIONSHIPS AMONG THE THREE RIO CONVENTION THEMATIC AREAS

2.6.1. Opportunities for synergy

Country institutions need to work synergistically around these agreements to be successful. While an agency or ministry is normally in charge of environmental issues, a number of activities may fall within the mandates of other ministries. According to UNDP (1997) examples of activities around which ministries can work synergistically include:

- Awareness raising
- Education and training
- Reporting
- Data gathering and inventories
- Public participation
- Research

Recognizing potential synergies among instruments must be part of the planning process with the identification of common thematic areas being the first step towards the implementation of synergetic activities. Mouat et al. (2006) report on opportunities for synergy highlights that many countries recommended the formation of an internal central organization to represent the overall umbrella, or national authority, for coordination among the environmental conventions. This central coordinating committee should include decision makers, representatives of implementing agencies, the private sector, non-governmental organizations (NGOs), community-based organizations, and representatives of stakeholders and of concerned ministries.

In the specific case of coordinating research efforts it also makes sense to establish a central coordination organism that could be called the National Research Council (NRC). NRC could be in charge of the following activities:

- Emphasizing need for synergy among research priorities and activities
- Assessing and coordinating national capacity-building needs
- Establishing mechanisms for effective coordination of research activities and reporting
- Promoting and stressing participatory role of stakeholders in research activities
- Coordinating and networking with international partners for developing synergetic research programs
- Centralizing information about research funding opportunities

Education and capacity building as well as outreach and technology transfer are also common themes that need to be considered within the same framework for the conventions. Capacity building will enable the development of capabilities of individuals, groups, organizations, and institutions to address environmental issues as a part of a range of efforts to promote sustainable development. According to the UNDP (1997) these capabilities may include technical and scientific knowledge, practical knowledge of resource management skills, data and information management, communication, training and empowerment, financial management, institutional development, leadership and management, policy development and analysis, and other areas of activity. Capacity building activities should include relevant partners and stakeholders to ensure the effectiveness of their participation in policies, plans, and processes affecting them. Country-level capacity building should be carried out as part of a comprehensive and integrated approach to sustainable development, one that takes into account overarching concerns including livelihood needs, poverty alleviation, and gender issues.

Capacity building and outreach activities and interventions that help maximize synergy under each convention include:

- Adaptation of curriculum at different academic levels to include topics of interest to all environmental agreements such as expanding curriculum in environmental sustainability, environmental law and policy, climatology, and water resource management;
- Use of existing national and regional centers or institutions to provide training in the form of short courses or workshops in topics of interest to the agreements such as remote sensing, geographical information systems, geostatistics, and collection of baseline data on forests that could be used for biodiversity assessments, calculation of carbon sinks, and desertification patterns and trends;
- Outreach activities to raise public awareness at the national and local levels through media, fact sheets, public relation materials, TV and radio programs that address issues relevant to the agreements;
- Stakeholder engagement activities at the local and regional levels such as involving local authorities in the planning and implementation of key components of the agreements.

2.6.2. Common thematic areas

In terms of research activities synergy we can argue that a fundamental understanding of current climate variability and projected climate change is of fundamental importance for the implementation of Rio Conventions in the country. Understanding of the climate system, sectorial impacts and development of effective adaptation strategies and GHG emission reduction actions requires not only physical science but also social science research to identify stakeholder needs and strategies with good chance of implementation and success. Within climate sciences the following research topics are common to the various sectors of society including water resources, agriculture and food security, public health, industrial, energy and transportation sectors, and socio-economic impacts (Figure 2):

- Inventory of greenhouse gas (GHG) emissions
- Spatial and temporal analysis of climate variability at local-long time period scale;
- Climate change projections and regional (spatial) and temporal downscale analysis;
- Vulnerability and resilience of the various sectors of society
- Development and implementation of adaptation strategies.

Climate projections are of particular importance as uncertainties and time frame for consideration are key elements in the analysis. Climate projection uncertainties are generally due to (Hawkins and Sutton 2009):

1. Initial condition uncertainty associated with errors in observing systems or in how the observational estimates are used to initialize prediction systems;
2. Uncertainty in external forcing. This can be either natural (changes in solar radiation reaching the top of the atmosphere; changes in atmospheric composition due to natural forcing, such as volcanic explosions) or anthropogenic (changes is the atmospheric composition and land surface properties due to human influences);
3. Uncertainties in the formulation of the models used to make the predictions and assimilate the observations. These uncertainties are associated with a discrete representation of the climate system and the parameterization of sub-grid physical processes.

FIGURE 2: COMMON NEEDS FOR THE SUCCESSFUL DEVELOPMENT AND IMPLEMENTATION OF EFFECTIVE ADAPTATION STRATEGIE

It is important to notice that the contribution of each factor listed above to the total projection uncertainty changes with the lead-time (Figure 3). Projections with long lead times (80-100 years) are primarily due to global emissions scenario uncertainty. Projection uncertainties with shorter lead times (10-15 years) are mainly due to initialization of the models and model errors.

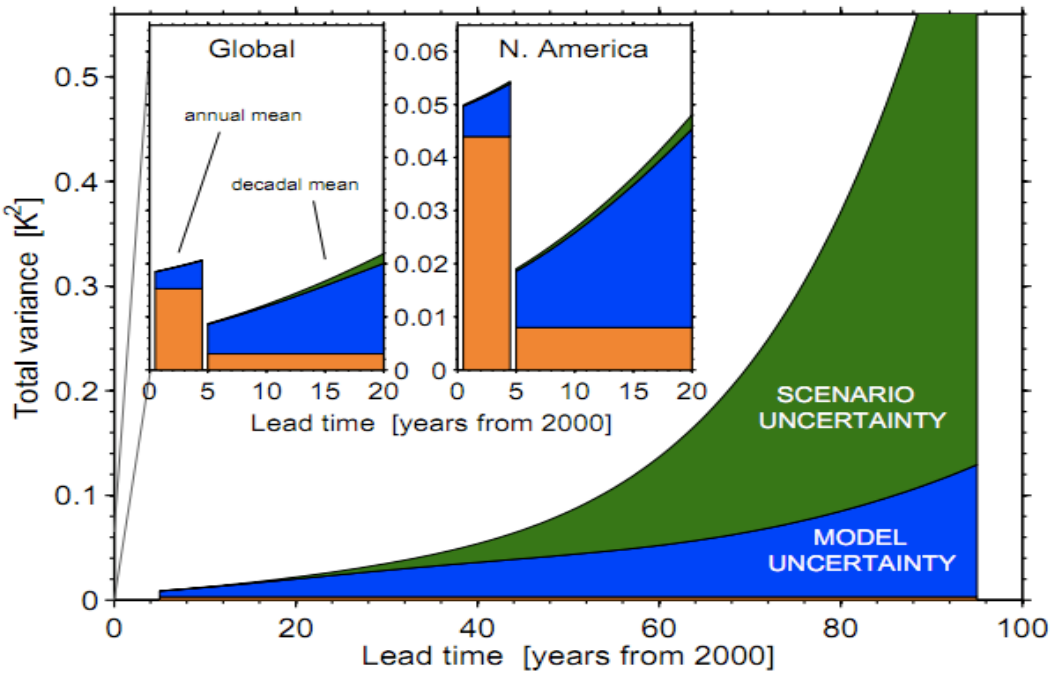

FIGURE 3: TOTAL VARIANCE OF THE DECADAL-GLOBAL MEAN SURFACE AIR TEMPERATURE SPLIT INTO THE THREE SOURCES OF UNCERTAINTY (ORANGE: INTERNAL VARIABILITY; BLUE: MODEL UNCERTAINTY; GREEN: SCENARIO UNCERTAINTY). INSETS: SAME AS MAIN PANEL BUT FOR LEAD TIMES LESS THAN

Given that lead times of interest will vary with sectors there is an important research aspect to determine what these lead times are for the different sectors such as water resources, agricultural and food security, and public health.

Table 12 shows potential synergetic activates between research on climate change, desertification and biodiversity. Synergies among the three Rio Conventions policy-oriented research areas are shown in Tables 7, 8 and 9.

TABLE 11: RESEARCH ON CLIMATE IMPACTS – POTENTIAL FOR SYNERGETIC ACTIVITIES

Climate Impacts Research Area & Main Focus		
Climate Change	Desertification	Biodiversity
Improving observations at the national level	Improving observations w/ focus on “hot spots”	Improving observations in areas of interest
Spatial and temporal analysis of climate variability including main driving forces	Spatial and temporal analysis of climate variability	Spatial and temporal analysis of climate variability
Climate change projections with a range of lead times from 10-100 years, investigate different downscaling techniques	Climate change projections with most appropriate lead times and focus on extreme events such as drought	Climate change projections with most appropriate lead times
Implications of projection uncertainty across regions and sectors	Implications of projection uncertainty on desertification	Implications of projection uncertainty on biodiversity
Socio-economic impacts with broad	More specific socio-economic	Socio-economic impacts

focus including all sectors	analysis, focus on regions and impacted stakeholders	focusing on biodiversity at most risk

2.6.3. Stakeholders engagement

Successful implementation of the agreements requires significant engagement of stakeholders in the process of developing and implementing solutions under the Rio Conventions. Participatory approaches should be used for research, development, and dissemination of research-based policies aimed at implementing the conventions. Integration and linkages of the research areas under the three conventions should be emphasized during the engagement of stakeholders.

The inclusion of participatory approaches such as “sondeos” (a semi-structured, multidisciplinary team discussion process), focus groups, semi-structured interviews, web-surveys, on-line feedback should be encouraged. The participatory processes enhanced legitimacy to policies and provided many additional useful benefits. In addition to being useful for feedback and dissemination, they provide a measure of accountability and transparency. Through participatory processes, stakeholders have better “buy-in” and some measure of ownership of the process of implementing the conventions. They also tend to nurture equality, by placing researchers and stakeholders on a level playing field.

3. Environmental Policy-Oriented Research Fund Framework

There is no exact procedure or framework used to derive policy-oriented research. The framework is based on priority areas that address the greatest needs of the country for advancements in environmental research while achieving the strategic objectives of the three Rio Conventions. The approach of addressing national needs while advancing in a research area is well-known in various international research institutions and agencies, such as EPA. In order for procedures to be effective, the roles of the Ministry of Environment in supporting policy-oriented research should be enhanced as a focal point, not only for following up implementation of the conventions, but also for attempting funding research projects and participating in implementation and transferring of results for decision-makers. Therefore, the guidelines and procedures, suggested in this document, are based on the assumptions that the Ministry of Environment will take the leadership in promoting and supporting the policy-oriented research in the areas of the three Rio Conventions. This should encourage all research institutions to follow the Policy-Oriented Environmental Research Fund Framework provided by the Ministry, providing that a collaboration mechanism among institutions and researchers is established and followed.

In order to have efficient procedures that save time and deliver outputs for decision making, it is important either to develop a new directorate or division within the Ministry of Environment under the theme "National Environmental Research Fund" or to upgrade existing ones (as the Section "Environmental Research" within the Directorate of Monitoring & Assessment, or the Directorate of Nature Protection, or the Directorate of Project Management, or the Directorate of Outreach). The national Thematic Research Groups (TRGs) and the National (steering) Committees for Rio Conventions should form part of the proposed Research Fund, which should operate under the umbrella of the Environment Protection Fund, which in turn needs revision of its regulations (2009) to introduce a framework for providing financial and technical support for research in the areas of environment protection and the three Rio Conventions in particular as a start. Furthermore, a mechanism for mobilizing financial resources from national and international sources should be considered by this proposed Fund. The mechanism can be achieved by linking the policy-oriented research in the areas of Rio Conventions with the priorities of the funding agencies. At the level of the Scientific Research Support Fund of Ministry of Higher Education and Scientific Research (MoHESR), it is suggested that the mechanism should incorporate the networking with this fund through either signing a Memorandum of Understanding (MoU) at the highest coordination and cooperation level and participation in proposal evaluation process or through mobilizing part of the fund for supporting proposals through a special channel in the Environment Protection Fund, providing that the proposal goes in line with priority areas of both agencies.

3.1. Goals and objectives of the proposed fund

The new National Environmental Research Fund should have a clearly defined goals and principles. The main goal could be something like "to improve government decision making through providing a robust framework of guidelines, procedure and suggested tools for promoting and supporting policy-oriented environmental research on topics of national priorities on the themes and obligations of the three Rio Conventions, as a start, to protect and sustain Jordanian natural environment". The main long-term goals of the Fund are:

1. To develop necessary policy and legal frameworks in Jordan to strengthen compliance with Global Environment (GE) conventions.
2. To address the root causes of the disconnect between environmental policy and research.

3. To achieve targeted environmental policy, legal and institutional reforms through policy-oriented research and to set the scene for innovation and continuous intervention, currently under-represented in the national efforts to respond to the GE commitments.
4. To translate the outcomes of applied research related to GE issues into policy and legal reform.
5. To addresses the systemic, institutional and individual policy-making capacity constraints and lack of utilizing outcomes of studies and applied research which retard compliance with GE conventions.
6. To direct researchers towards the most beneficial policy-oriented research priorities to meet the needs of Jordanian society and relevant line ministries towards the commitments and obligations to Rio Conventions.
7. To provide financial support for environmental policy-oriented research projects submitted by research institutions/NGOs/private sectors involved in the implementation of provisions and obligations of Rio Convention and related themes.
8. To improve the collaboration between environmental research and policy-making communities.
9. To set the ground and infrastructure to augmenting research budget in Jordan by 2017, as per the National Agenda, and the plan to direct 1% of taxes of the private sector towards applied research.

At the same time, the principles of the research fund could be: (1) Sustainability, (2) Solution Policy-Oriented, (3) Timeliness, (4) Responsiveness, (5) Relevance, and (6) Integrity. Building on the mandate of the national committees of the three Rio Conventions and the TRGs, the overall objectives of the Research Fund are as follows:

- In the Implementation of the Rio Conventions, promoting and supporting environmental research that helps developing policy-relevant capacities for the implementation of the Global Environmental conventions, by enhancing connectivity between the research and policy making for global environmental management.
- Mainstreaming and capitalizing upon existing national initiatives already engaged in the application of policies and laws through applied research, which will therefore ensure that the continuity of any enforcement measures of policies and laws will be based on nationally tested and demonstrated systems and approaches.
- Supervising, supporting, and sustaining the implementation of the UNFCCC, UNCCD and CBD in Jordan in accordance with national interests and providing needed advice in response to national and international commitments and obligations and effectively contributing in setting the national research priorities that will serve policy makers.
- Supervising and ensuring the development and execution of needed legal, regulatory and institutional arrangements and frameworks for supporting implementation of the Conventions.
- Advancing and facilitating setting up national programs on climate change adaptation and mitigation, combating desertification and conserving biodiversity on regular basis to support the government's sustainable development plans.
- Leading national efforts in adaptation to climate change, combating desertification and in conserving genetic resources, and ensures the integration of adaptation within other national development strategies and plans and enhancing the integration of gender dimension in these strategies.
- Promoting effective and sustainable management of climate change, desertification and biodiversity aspects in Jordan; providing needed coordination; following up country's technical progress; and providing recommendations for its improvement.
- Supervising national and regional activities related to climate change, combating desertification and conserving biodiversity in Jordan and the area.

1. In the programs and projects fields, promoting and supporting environmental research that helps to:

- Provide sound opinion and feedback on institutional and technical aspects of potential programs and projects pertinent to climate change, desertification and biodiversity.
- Facilitate setting national project priorities, in line with objectives and mandates of TRGs and national committees, and following up implementation of such projects.

2. In the collaboration, provision of information, and advices fields, promoting and supporting environmental research that helps in:
   - Identifying most appropriate, effective and sustainable, national collaboration and coordination priorities between research and policy making agencies with emphasis on evaluating the cases of existing collaboration mechanism such as the national Rio committees, TRGs, and other collaboration mechanism between research and education institutions from one side and policy makers from the other side in the areas of climate change, desertification and biodiversity in particular and other environmental topics in general.
   - Fostering the role and function of existing and proposed research-for-policy bodies to act as national advisory bodies by providing overall institutional and technical guidance to policy makers on their mission for implementing national obligations, commitments and activities related to climate change, desertification and biodiversity.
   - Supporting collaboration, coordination, and synergies with existing national, regional, and international research-for-policy initiatives and ensuring the engagement of all relevant stakeholders in such initiatives as well as encouraging ties between relevant national entities and liaising and facilitating cooperation with other relevant regional and international initiatives and programs in the areas of the three Rio Conventions.
   - Promoting and presenting case studies of cooperative studies, research, and information exchange initiatives on climate change, desertification and biodiversity issues nationally, regionally, and internationally. The committee will strengthen links between the science community and policy makers and coordinates with the research funding sources to ensure adequate funding for these priorities.

3. In the awareness field, promoting and supporting environmental research that helps in:
   - Ensuring advocacy for national, regional and international climate change, desertification and biodiversity issues identified by the conventions and relevant national entities, and also ensuring suitable awareness activities conducted amongst the public and private sectors on the impacts arising from these issues and the actions that could be taken from impacted sectors.
   - Advancing national and regional plans, aiming at establishing, awareness initiatives campaigns, and events to protect biodiversity, and combat desertification and land degradation and mitigate impacts of global warming and promote adaptation measures and actions.

4. In the financial, technical support, and capacity building fields, promoting and supporting environmental research that helps in:
   - Assessing and strengthening the country's capacity building, development, and training needs on climate change, desertification and biodiversity issues and recommending and ensuring coordination and collaboration for addressing these needs nationally, regionally and internationally.
   - Identifying and assessing potential funding mechanisms locally, regionally and internationally that supports research and projects in the areas of Rio Conventions and other environmental topics.
   - Introducing plans for tripling research budget in Jordan as per the national plans and agendas, with emphasis to direct percentages of taxes of the private sector towards applied research.

In order to achieve the goals and objectives of this envisioned Fund, two sets of procedures of the overall fund framework actions are proposed. Based on the proposed collaboration mechanisms between research institutions and line ministries advanced by the CB-2 Project, it is suggested to adopt a national strategic mechanism or framework of environmental policy-oriented research-support procedures for conducting, promoting and supporting policy-oriented research related to GE issues in Jordan (with emphasis on the thematic areas of three Rio Conventions) and integrating global environmental issues and provisions of the 3 Rio Conventions into policies and national development plans based on research (Figure 4).

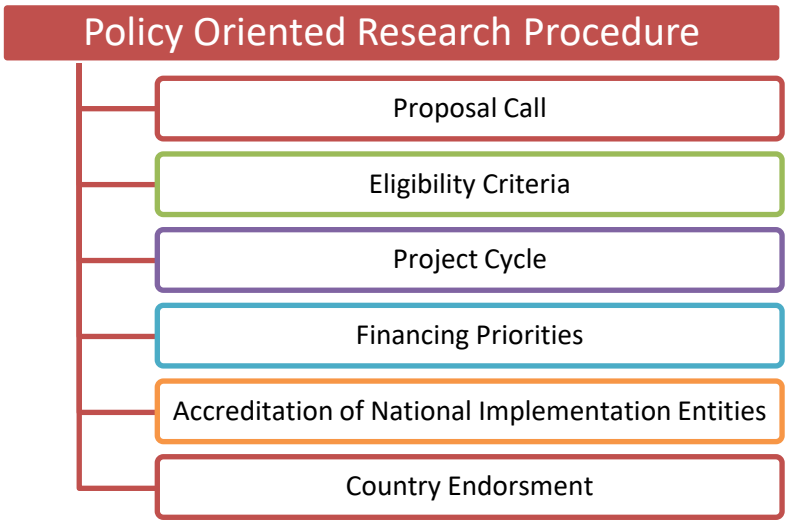

FIGURE 4: POLICY ORIENTED RESEARCH FUND PROCEDURES

3.2. Institutional Arrangements of the Fund Framework

The ministry, through the framework, will provide guidance for researchers on the major research priorities on a regular basis, funding windows, and suggested technical research procedures and tools for conducting research projects achieving the obligations/provisions of the three Rio Conventions while contributing to national priorities in the same time. This systematic mechanism is expected to encourage research institutions to abide with the research guidelines provided by the Fund. This should be achieved by establishing the Fund within the ministry premises as a branch of the existing "Environmental Protection Fund" to access the objectives and goals of funding policy-oriented research relevant to Rio Convention.

In order to enable the MoEnv to lead and guide the national policy-oriented research affairs in the areas of the Rio Conventions, it is recommended to have concrete institutional arrangements. Similar to the international foundations of United States NSF and EPA, a "National Scientific Board" should be established under the directorate responsible for program creation and administration, merit review, planning, budget and day-to-day operations. On the other hand, there should be two separate scientific committees working within the research Fund; the first might be called "Planning Committee" responsible for assuring the sustainability of the framework (i.e. guidelines, procedure and tools) that meets on regular basis and updates the guidelines, procedure and tools every at least three years, while the second might be called "Evaluating

and Assessment Committee" responsible for reviewing, editing, evaluating and monitoring the policy oriented-research from the proposal point till the implementation and dissemination of results. These scientific committees should have maximum number of national Thematic Research Groups (TRGs) and the National (steering) Committees for Rio Conventions (Figure 5).

The two scientific committees can be inter or cross-related through the "Dissemination of Results" panel. This panel is responsible for gathering information from the two committees and integrates both of them through useful collaboration mechanism. In order to facilitate the framework of the committees and the board, a "Research Data Bank" should be established within the ministry. The data bank will provide both committees with the international and national research scientific manuscripts and information resources related to the three Rio Conventions. The bank will also provide a bibliographic system with names and activities of each institution/NGO/private sector, publications, and personnel names engaged or have interests in research activities relevant to the three conventions. The research data bank will act as "Accessing Research Findings and Reports Online" though which a website or virtual platform that will be the preferred method to access research findings and reports online. This platform can be a one stop shop that will allow both policy makers and researchers to have access easily and whenever they want in order to obtain specific data needed for decision making or conducting research activities. Also, it is important to include policy recommendations or implications at the completion of the project and at dissemination of results. It will be helpful to know how research results will impact policy, and it will be helpful if researchers cite any improvement in policy/legislations. The recommendations should be precise and in clear, understandable language in order to be very helpful.

A Virtual Platform is being under construction now by a local consultant (Balqa Applied University, BAU) under the title "Design and Program the Virtual Platform for Information Collection, Processing, Analysis and Dissemination" (CB-2 Project). Another CB -2 Project output entitled "Provide Recommendation on the Design Structure of Virtual Platform for Information Collection, Processing, Analysis and Dissemination" of BAU's original consulting study and is intended to put in place the necessary infrastructures, modules, procedures, and tools to collect, assemble, analyze and manage dissemination of information to support the connectivity between the research and policy making for the management of the implementation process of Rio Conventions in Jordan as well as to provide this information to various stakeholders in a timely and comprehensive way. The virtual platform will be designed as the core block in the blueprint for a national Environmental Information System for Jordan, JEIS, a vision envisaged by the CB-2 Project aiming at integrating all scattered existing and to-be-established environmental information systems and initiatives.

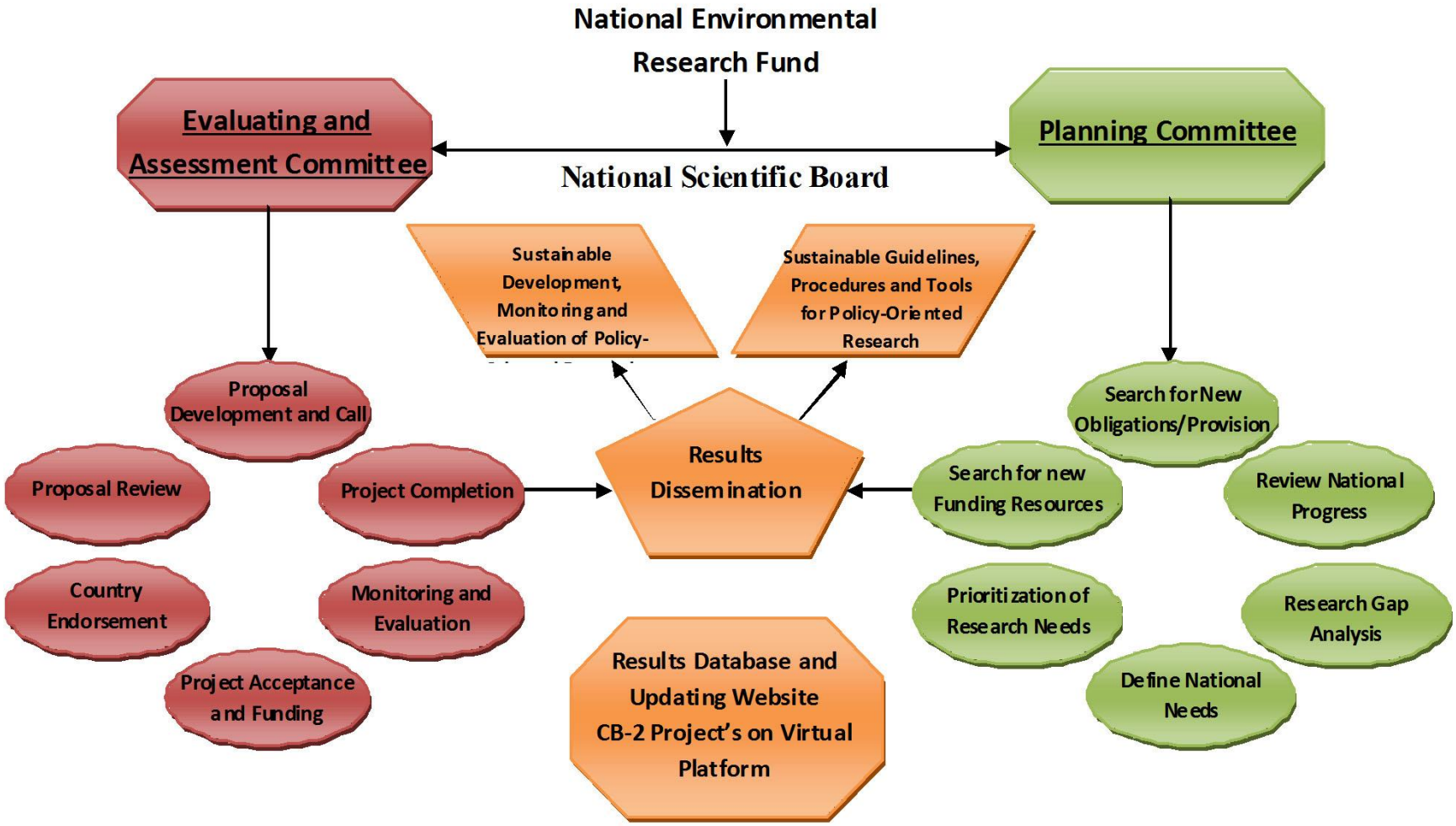

FIGURE 5: PROPOSED STRATEGIC MECHANISM FRAMEWORK OF RESEARCH PROCEDURES FOR CONDUCTING, PROMOTING AND SUPPORTING POLICY-ORIENTED RESEARCH RELATED TO RIO CONVENTIONS

3.2.1. Proposal call

Once the policy-oriented research are prioritised and the financial resources are allocated, a proposal call is set on the website for all national research institutions/NGOs/ private sector to submit proposals. A well-established "Application Form" should be provided. The application form is considered systematic steps of actions necessary to achieve the goals of proposal. Thus, a "proposal preparation kit" will be developed. This kit should include main forms, guidelines, procedures and tools required for the researcher to write an accurate uniformed-type research plan for implementation and dissemination of results. The key issues will include justification of the research and its contribution to knowledge and problem-solving, institutional capacity, application process, research methodology, scale of the study, data needed and methods of data collection, models and algorithms to be implemented, expected milestones and deliverables, budget forecasting, management flow chart and roles of researchers, timetable and schedule, roles of end users and involvement of local communities, role of women and youth, impacts of the project at different levels, and methods to disseminate and transfer results particularly to policy makers.

3.2.2. Eligibility criteria

In order to sustain the goals of the research Fund at the MoEnv, the Fund should adopt eligibility criteria for research institutions/NGOs/private sector and any researcher or research team to submit for fund. The criteria should take into account the following points:

1- Research area eligibility according to national priorities of the policy-oriented research themes.
2- Institutional eligibility as institutional capacity, personnel and accreditation.
3- Researcher eligibility as nationality, qualifications and degree, expertise in relation to the project, etc.
4- The inclusion of multidisciplinary team of researchers and research assistants.
5- Grant size eligibility as small or large fund concerns.
6- Participation and collaboration eligibility as applications can be developed for a research grant submitted by an individual researcher or a team of researchers (one applicant plus one or more co-applicants and/or collaborators). Research collaborator, student assistant; and other assistants and support staff must meet the eligibility criteria specific to their category. This should include their qualifications in relation to their roles in the proposed project.

3.2.3. Project cycle

The Evaluating and Assessment Committee should adopt a simple project cycle to ensure the integrity and sustainability of the processes, derive a project appraisal to review the project design in detail and resolve any outstanding questions, and to deliver a streamlined approval process. The committee reviews the research proposal plan of in terms of: a) justification of the policy-oriented research and its contribution to knowledge, policy-making support, and problem-solving, b) research methodology, c) scale of the study, d) methods and tools required for implementing the research, e) expected outcomes and deliverables, f) management flow chart and roles of researchers, g) roles of end users and involvement of local communities, h) role of women and youth, i) possible impacts and barriers of the project at different levels, and j) methods to disseminate and transfer final results. Also, external peer reviewers might be asked to assess and grade the proposal according to the pre-award assessment criteria. Proposers will be given an opportunity to respond to comments provided by external reviewers. All comments arising from external peer review will be sent to the revising Panel.

Once the identification and preparation phases are reached and the expected project outcomes are confirmed, intended beneficiaries and evaluation tools for monitoring progress should be established. The National Environmental Research Fund board should develop a "**Moderating Panel"** to define an agreement to be reached on the viability of all aspects of the project at this time. The Moderating Panel will receive the full proposal, any additional background information, reviewer comments and, where available, the proposer's responses to reviewers' assessments.

The National Environmental Research Fund board should confirm that all aspects of the project are consistent with Research Council operations requirements and that the institutional arrangements in terms of institutional capacity and/or "Country Endorsement" in place to implement the project efficiently. All parties agree on a project timetable and on public disclosure of key documents and identify any unfinished business required for final committee approval. The final steps are assessment of the project's readiness for implementation and agreement on conditions for effectiveness (agreed upon actions prior to implementation), this include budget forecasting. The system should take into account the fund size. Small-size fund projects should have a simplified approval procedure; however, large-size projects should have a country endorsement and or legal accreditations for nation implementation entity to ensure the smooth progress of the project.

The Project Information Document is updated and released when the project is approved for funding. Once all project details are negotiated and accepted by the committee and National Scientific Board, the project team prepares the legal documents to be accepted and signed by the two parties and the implementation phase begins.

The Evaluating and Assessment Committee should assess the performance of each project along the agreed timetable plan, measuring outcomes against the original objectives, sustainability of results and institutional development impact. From time to time and upon completion of the project, the monitoring unit will provide Impact Evaluation Report to assess the economic worth of projects and the long-term effects on people and the environment against an explicit counter-factual as a matter of sustainability insurance of the project outcomes to end-users.

3.2.4. Financial priorities

The overall goal of the National Environmental Research Fund Board is to support research institutions/NGOs/private sector to implement policy-oriented projects that supports the needs of the line-ministries in providing knowledge and information for decision makers to update or derive new national policies related to Rio Conventions (i.e. improve environmental sustainability development of Jordanian legislative personnel to derive the right policies according to prioritised national obligations and/or provisions needs as related to Rio Conventions). The provision of funding should be based on, and in accordance with, the strategic policy-oriented research priorities. Submitted projects should be prioritised according to the following: (1) synergies between the three Rio Conventions and research areas, (2) level of urgency and risk, (3) size and access of the fund, (4) national and regional benefits of the project, (5) lessons-to-be learned after conclusion of the project and implementation to be captured, and (6) maximizing cross- or multi-sectoral benefits. Thus, having two project-proposals within the same policy-oriented reach field should be compared and prioritized upon the mentioned points. The council should allocate the best funding resources for each project from the funding resources window that satisfies the main goals and research area of the project.

3.2.5. Accreditation of the national implementation entity

Some funding association and agencies such as the "Adaptation Fund" offer a direct access for developing countries such as Jordan. Vulnerable developing countries can nominate domestic institutions for accreditation as National Implementing Entities (NIEs), which will be responsible for endorsing projects and program proposals from their countries, and will be direct recipients of funding. This increases financing opportunities for vulnerable developing countries and gives them a sense of ownership of the fund. Countries also have the option of going through Multilateral Implementing Entities (MIEs). The institutions nominated must meet certain standards that ensure sound fiduciary management and oversight, functions that usually are performed by the multilateral agencies. The accreditation panel within the funding agency reviews the application and forwards its recommendation to the Fund Board for a decision. Following a positive funding decision, the implementing entities distribute the resources within countries to those governmental agencies, nongovernmental organizations, and other stakeholders that will execute the projects or the programs. Jordan recently, and through a lot of effort, has received an accreditation for the Ministry of Planning and International Cooperation (MOPIC) as NIE. It is worth to mention that this NIE is considered the seventh world-wide and the first in Middle East and it was the first time the Adaptation Fund Board has accredited government ministries as NIEs, this will provide a good financing opportunities that gives sense of funding-ownership to the country.

It might be important to have an accreditation panel within the MoEnv since a well established Jordan Standards and Metrology Organization (JSMO) exists for accrediting testing and calibrating laboratories and certification bodies. However, collaboration between the JSMO and MoEnv is required to eligibility of the implementing institution in the fields of standards, metrology, conformity assessment and laboratory accreditation through establishment of a national system of measurement and supervising its implementation for all projects to be funded by the ministry. The accreditation decision depends on the capacity of the implementing entity, researchers' expertise, instrumentations available, and methodologies and standards adopted by the entity.

3.2.6. Country endorsement

Some funding associations or agencies require the endorsement of related governmental entities other than MoEnv within the project where it will be implemented to receive the fund. The endorsement are subjected for two reasons; (1) ensuring the progress of the project from legal and routine aspects, and/or to derive subsidies from the entity by paying a percentage from the fund. In this case, collaboration between ministries is required to receive the fund. The Operational Focal Point is responsible for the endorsement letter. For example the UN Global Environment Facility (GEF) administers three trust funds; the GEF Trust Fund, Least Developed Countries Trust Fund (LDCF) and Special Climate Change Trust Fund (SCCF) and provides secretariat services, on an interim basis, for the Adaptation Fund. The GEF Trust Fund is the main funding resource of the Global Environment Facility (GEF). Climate Change is one of the six focal areas supported by the GEF Trust Fund. The objective of this fund is to help developing countries and economies in transition to contribute to the overall objective of the United Nations Framework Convention on Climate Change (UNFCCC). Projects support measures that minimize climate change damage by reducing the risk, or the adverse effects, of climate change. A project has to be endorsed by the country or countries where it will be implemented to be considered to receive GEF funding. In most cases MoP are endorsed with related ministries.

3.3. Development of Policy-oriented Research Procedures for Researchers in Institutions/NGOs/Private Sector

The procedures of policy-oriented research offered for researchers may include systematic steps of actions necessary to achieve the approval of the research along with the national goals' needs. Thus, the procedures may include proposal preparation kit, strategic research priorities, financing resources windows, available research tools, and an-over view of the eligibility criteria and the application process.

The key issues that should be included in the proposal are justification of the research and its contribution to knowledge and problem-solving, institutional capacity, application process, research methodology, scale of the study, data needed and methods of data collection, models and algorithms to be implemented, expected milestones and deliverables, budget forecasting, management flow chart and roles of researchers, timetable and schedule, roles of end users and involvement of local communities, role of women and youth, impacts of the project at different levels, and methods to disseminate and transfer results. In addition, approaches and tools used for conducting a policy-oriented research within each thematic area of the Rio Conventions (Tables 10, 11 and 12) should be included.

3.4. Gender Mainstreaming in the Research Cycle

In research programs gender mainstreaming can refer to the way in which policy-oriented research incorporate gender perspectives so that the overall research framework, approach, methodologies and tools employed to conduct the research are clearly gender sensitive. According to the Toolkit Gender in EU-funded research (2011), the gender-sensitive research cycle (Figure 6) takes gender into account at all stages of the research cycle. It demonstrates that gender-sensitive research takes a twin approach: it pays attention to the participation of women and men, providing equal opportunities for all, and it integrates gender into the research content all the way from the initial research idea to the dissemination of results.

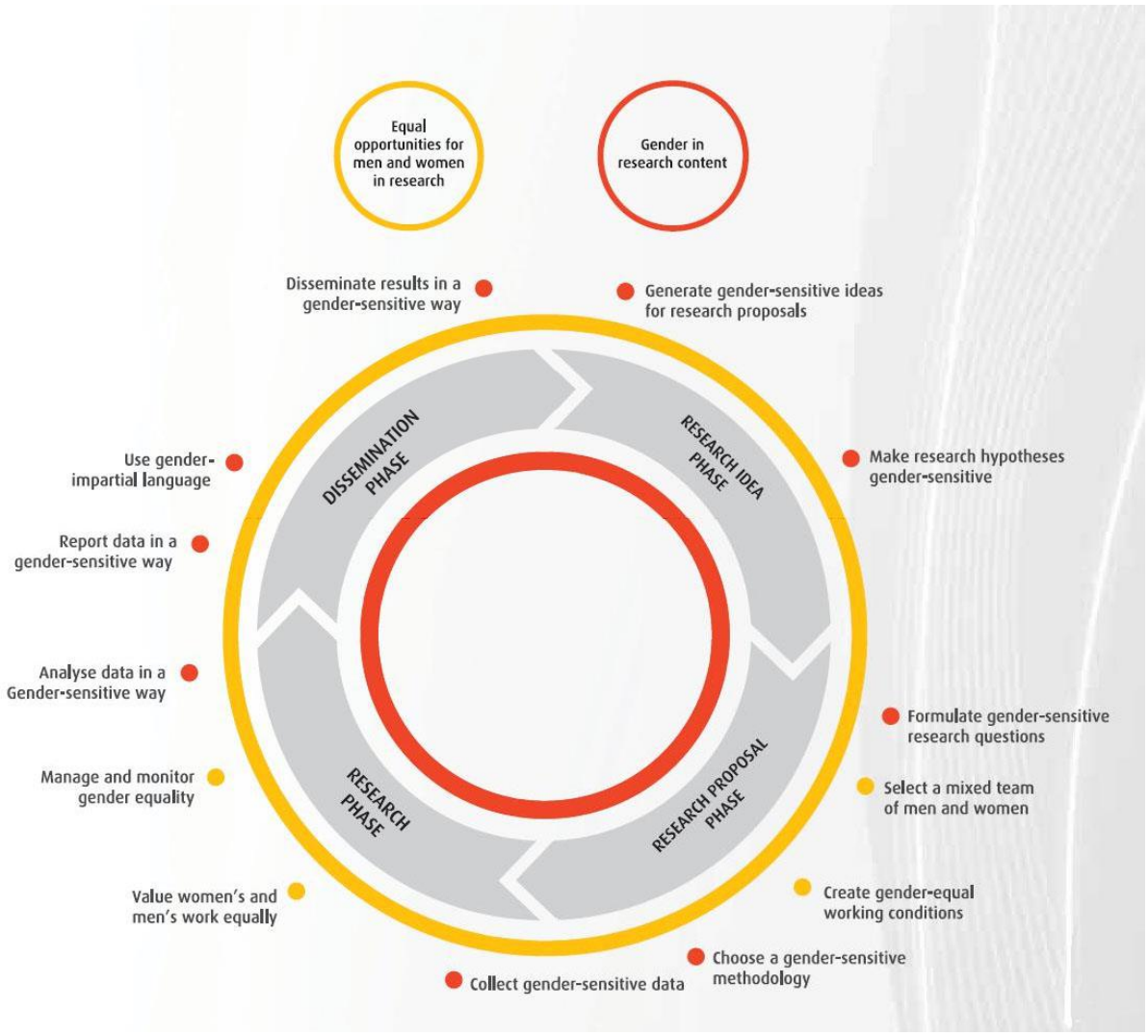

FIGURE 6: THE GENDER-SENSITIVE RESEARCH CYCLE (TAKEN FROM THE TOOLKIT GENDER IN EU-FUNDED RESEARCH, 2011)

3.4.1. Participation of women and men in research

According to the Toolkit Gender in EU-funded research (2011), academic research on inequalities in the research sector and on the loss of women from the profession has shown that these are a consequence of an accumulation of many differences and biases. Some are small, while others are overt forms of discrimination and resistance. Many are implicit, unconscious, but often very powerful, biases in values, priorities and practices.

- Selection and recruitment

There is evidence that men and women are not assessed on the same basis, and neither are their respective achievements. To avoid gender bias, it is important to: ensure open and impartial selection procedures: use mixed selection panels, train panel members on gender bias, advertise open posts widely, explicitly encourage women to apply, accommodate atypical career patterns; use explicit, precise and transparent selection criteria: set standards that are relevant to the pursuit of scientific knowledge, use appropriate indicators of performance that fit the life-cycle productivity of both men and women.

- Working conditions and culture

The culture of the workplace influences whether women scientists, and increasingly also men, feel welcome. What is needed is a working culture that fosters equal working conditions (pay, opportunities for training, access to grants and funding), is aware of different possibilities in terms of geographical mobility, and accommodates private commitments or different career structures. This is also relevant within projects, for instance in scheduling and organizing meetings or activities requiring mobility.

- Monitoring and management measures

To improve equality it is important to acknowledge that bias and discrimination might indeed exist and to investigate what is going wrong. Reducing gender bias in research calls for the active involvement of all participants in the process, both men and women, at all levels. Actions may include: setting ratios for participation, putting in place monitoring systems, installing feedback mechanisms and appointing a trained gender equality officer.

3.4.2. Gender in research content

- Research ideas and hypotheses

The relevance of gender for and within the subject matter needs to be analyzed and an assessment made of the state of knowledge in this respect. The formulation of hypotheses can draw upon previous research and existing literature. Indeed, the body of knowledge on gender issues has been steadily growing over recent decades, and can serve as interesting reference material to build new hypotheses for future research.

- Project design and research methodology

While research methodologies may vary, they all strive to represent (aspects of) reality. Whenever this reality concerns humans, any scientifically sound methodology should differentiate between the sexes and take into account men's and women's situations equally. Groups such as 'citizens', 'patients', 'consumers', 'victims' or 'children' are therefore too general as categories.

Research implementation

Data collection tools (such as questionnaires and interview checklists) need to be gender-sensitive, use gender-neutral language, and should make it possible to detect the different realities of men and women. This will help to avoid gender bias. For example, answers to be provided by the 'head of household' are not necessarily valid for all household members.

Data analysis: In most research concerning human subjects, data are routinely disaggregated by sex, which would logically lead to analyses according to sex. However to date this is still not common practice. Systematically taking sex as a central variable and analyzing other variables with respect to it (e.g. sex and age, sex and income, sex and mobility, sex and labor) will provide significant and useful insights. Involving gender-balanced end-user groups in the course of the research is also a good way of guaranteeing the highest impact.

- **Dissemination phase – reporting of data**

Collecting and analyzing gender-specific data is not enough if they are omitted from the published results. Gender should be included in 'mainstream' publications as it is as much part of daily reality as any other variable studied. Specific dissemination actions (publications or events) for gender findings can be considered. Institutions and departments that focus on gender should be included in the target groups for dissemination. Publications should use gender-neutral language.

3.4.3. Checklist for gender in research

According to the Toolkit Gender in EU-funded research (2011), the following checklist can be used to make sure gender mainstreaming is done in the proper way.

Equal opportunities for women and men in research

- Is there a gender balance in the project consortium and team, at all levels and in decision-making positions?
- Do working conditions allow all members of staff to combine work and family life in a satisfactory manner?
- Are there mechanisms in place to manage and monitor gender equality aspects, e.g. workforce statistics?
- Gender in research content

Research ideas phase:

- If the research involves humans as research objects, has the relevance of gender to the research topic been analyzed?
- If the research does not directly involve humans, are the possibly differentiated relations of men and women to the research subject sufficiently clear?
- Have you reviewed literature and other sources relating to gender differences in the research field?

Proposal phase:

- Does the methodology ensure that (possible) gender differences will be investigated: that sex/gender differentiated data will be collected and analyzed throughout the research cycle and will be part of the final publication?
- Does the proposal explicitly and comprehensively explain how gender issues will be handled (e.g. in a specific work package)?
- Have possibly differentiated outcomes and impacts of the research on women and men been considered?

Research phase:

- Are questionnaires, surveys, focus groups, etc. designed to unravel potentially relevant sex and/or gender differences in your data?
- Are the groups involved in the project (e.g. samples, testing groups) gender-balanced?
- Is data analyzed according to the sex variable? Are other relevant variables analyzed with respect to sex?

Dissemination phase:

- Do analyses present statistics, tables, figures and descriptions that focus on the relevant gender differences that came up in the course of the project?
- Are institutions, departments and journals that focus on gender included among the target groups for dissemination, along with mainstream research magazines?
- Have you considered a specific publication or event on gender-related findings?

4. References

Adger W. N., Lorenzoni I., O'Brie L. K. (2009). Adapting to climate change. Cambridge university press. UK.

Allard, R.W. (1970). Populations structure and sampling methods. Pp. 97-107 in Genetic Resources in Plants (O.H. Frankel and E Bennett, eds.). Blackwell, Oxford.

Alec L. Panchen. (1992). Classification, Evolution, and the Nature of Biology. Cambridge University Press. UK.

Andow. D.A. (2005) Characterizing ecological risks of introductions and invasions. Invasive Alien Species. pp. 84–103. Island Press, Washington, DC.

BAU (Al Balqa Applied University, Jordan). 2011. Final report ' A study of Potential institutional mechanism for future collaboration between policy and research institutions in relations to Rio Conventions'- FRP1 of CB-2 Project, UNDP Project: Developing Policy Capacity, RFP 2010/12, UNDP, Amman, Jordan.

Chapman. A. D. (2005). Uses of Primary Species-Occurrence Data, version 1.0. Report for the Global Biodiversity Information Facility, Copenhagen.

Cowie, A. L., Penman, T. D., Gorissen, L., Winslow, M. D., Lehmann, J., Tyrrell, T. D., Twomlow, S., Wilkes, A., Lal, R., Jones, J. W., Paulsch, A., Kellner, K. and Akhtar-Schuster, M. (2011). Towards sustainable land management in the drylands: Scientific connections in monitoring and assessing dryland degradation, climate change and biodiversity. Land Degradation & Development 22: 248–260.

DONG. Xu. (2009). Evaluation of Forest Resources in Qinghai Province. Journal of Anhui Agricultural Sciences, 12.

European Commission for research and innovation, (2011). Toolkit Gender in EU-funded research.

"Framework Convention on Climate Change" available at < http://unfccc.int/essential_background/convention/items/2627.php >

GTZ, (2009) "Planning to Deliver: Making the Rio Conventions more Effective on the Ground" by Anju Sharma.

Hawkins, E. and R. Sutton, 2009: The potential to narrow uncertainty in regional climate predictions. Bull. Amer. Soc., 90, 1095-1107.

Integral Consults, " Egypt National Capacity Self Assessment (NCSA) Phase III: In Depth Study for Pritorized Cross Cutting Capacity Constraints for the Three Rio conventions" available at < www.eeaa.gov.eg >

Jaber J.O., Probert S.D., (April 1999) Environmental impact assessment for the proposed oil-shale tri-generation plant .

Lijbert B., Caron P., Campbell B., Leslie L., Susan M. Rudy R., Didier B. Mirjam. (2010). PullemanReconciling biodiversity conservation and food security: scientific challenges for a new agriculture. Science direct. www.siencedirect.com.

Millennium ecosystem assessment. 2010, sub-global Arab millennium ecosystem assessment, Saudi Arabian millennium ecosystem assessment for Assir national park.

Neely M., Jeffrey A. , Kenton R., Walter V., Mittermeier A., Werner B. (1990). Conserving the world's biological diversity. IUCN, WRI, WWF-US, World Bank, Conservation International.

MoEnv (Ministry of Environment, Jordan). 2008. The Integrated Financing Strategy for Combating Desertification in Jordan. Ministry of Environment, Amman, Jordan.

MoEnv (Ministry of Environment, Jordan), (2007). "National Capacity Self Assessment for Global Environmental Management (NCSA) – Jordan".

Mouat, D. Lancaster J., El Baugori, I., Santibañez, F. 2006. Opportunities for synergy among environmental conventions: Results of national and local level workshops. Secretariat of the United Nations Convention to Combat Desertification (UNCCD), Bonn, Germany. 51p.

Organization for Economic Co-operation and Development, (2002) " The DAC Guidelines- Integrating Conventions into Development Co-operation" (2002)

Science Triangle for Research, Training and Management, (2011) "Draft Inception Plan "Developing Policy-Oriented Research Guidelines, Procedures and Tools to Support Implementing Rio Conventions in Jordan".

Scheldeman, X. & van Zonneveld, M. (2010). Training Manual on Spatial Analysis of Plant Diversity and Distribution. Biodiversity International. Rome.

Shaily M. and Kamaljit S. (1997). "Applications of Geographic Information Systems, Remote-Sensing, and a Landscape Ecology Approach to Biodiversity Conservation in the Western Ghats" Current Science 73.2: 134-145.

Status, Trends, Ecosystem Services, and Restorability, Annual Review of Environment and Resources Vol. 30: 39-74 (2005).

Steve Archer and David A. Pyke. (1991), Plant-animal interactions affecting plant establishment and persistence on revegetated rangeland, Journal of Range Management Journal of Range Management Vol. 44, No. 6 pp. 558-565.

"The Rio Conventions" available at < www.cbd.int/rio/ >

UNCCD (United Nation Convention to Combat Desertification), (2009). The UNCCD 1st Scientific Conference: Synthesis and recommendations and COPs-CST Ninth session, Buenos Aires, 22-25 September 2009.

UNDP. Synergies: The Rio Agreements. Sustainable Energy and Environment Division, 304 East 45th Street, 10th Floor, New York, NY.

United Nations Development Program (UNDP). 1997. Synergy in national implementations: The Rio agreements. Sustainable Energy and Environment Division. New York, NY. 72p.

Wilson, E.O. 1992. The Diversity of Life. W.W. Norton & Company Inc. New York, NY.

World Resources Institute (2002). Designing a customized greenhouse gas calculation tool, Washington.

World Resources Institute (2004). World Business Council for Sustainable Development: Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard, available at:http://www.ghgprotocol.org/standards

Annex 1. Description of main policy-oriented research tools for climate change studies

Tool	Description
Waste Reduction Model (WARM)	EPA created the Waste Reduction Model (WARM) to help solid waste planners and organizations track and voluntarily report greenhouse gas emissions reductions from several different waste management practices. WARM calculates and totals GHG emissions of baseline and alternative waste management practices—source reduction, recycling, combustion, composting, and landfilling.
Emission Factor Database	The IPCC Emission Factor Database (EFDB), version-1, as of December 2003 contains all default values included in the 1996 IPCC Guidelines and additional data accepted by the EFDB editorial board. The EFDB contains country-specific data for NCV and CEF including developing countries.
IEA Database	International Energy Agency NCV database for all fuels, as of November 2004. The IEA database contains country-specific NCV data for many countries, including developing countries.
Probability density function (PDF)	The PDF describes the range and relative likelihood of possible values. The PDF can be used to describe uncertainty in the estimate of a quantity that is a fixed constant whose value is not exactly known, or it can be used to describe inherent variability. The purpose of the uncertainty analysis for the emission inventory is to quantify uncertainty in the unknown fixed value of total emissions as well as emissions and activity pertaining to specific categories.
Waste Stream Analyses (WSA)	MSW treatment techniques are often applied in a chain or in parallel. A more accurate but data intensive approach to data collection is to follow the streams of waste from one treatment to another taking into account the changes in composition and other parameters that affect emissions. Waste stream analyses should be combined with high quality country-specific data on waste generation and management. The approach is often complemented with modeling. When using this approach, it is good practice to verify the data using separately collected data on MSW generation, treatment and disposal, especially in cases where they are based largely on modeling. This method is only more accurate than the approaches given above if countries have good quality, detailed data on each end point and have verified the information.
UNFCCC-NAI Software	Assists NAI Parties to compile their national GHG inventories and prepare their national communications. Based on the commercial spreadsheet application Microsoft Excel. Users must have Excel 2000 or later version. Includes a custom menu system to help users move through the worksheets and reporting tables. Many of the formulas for calculating emission estimates are included in the worksheets. The software package consists of the following files: START.XLS, OVERVIEW.XLS, MODULE1.XLS, MODULE2.XLS, MODULE4.XLS, MODULE5.XLS, MODULE5B.XLS, and MODULE6.XLS. In general, this software uses Tier 1 methodologies for estimating GHG emissions and removals for all source categories described in the IPCC Guidelines. The software is based on the IPCC inventory software version 1.1, but has additional features not present in the IPCC software. These are described in Sections 4 and 5 of the software manual.
General Circulation Models (GCMs)	A general circulation model (also known as a global climate model, both labels are abbreviated as GCM) uses the same equations of motion as a numerical weather prediction (NWP) model, but the purpose is to numerically simulate changes in climate as a result of slow changes in some boundary conditions (such as the solar constant) or physical parameters (such as the greenhouse gas concentration). General Circulation Models are divided into several types depending on which factors they include in their simulation of climate and weather. The two main types of General Circulation Models are Atmospheric and Ocean models. Separately they account for the changes within the atmosphere and the ocean respectively. Put together they make up a complete climate model. When two systems are connected the resulting more complete system is called a 'coupled' model. Coupled atmosphere-ocean General Circulation Models (AOGCMs) are the models most often used to make the predictions of future climate. These predictions are sometimes called scenarios. Based on different scenarios the IPCC can recommend measures to mitigate global warming and can predict what results a specific reduction in greenhouse gas emission are likely to have. Advanced coupled atmosphere-ocean General Circulation Model can also to some extent predict regional climate changes. These predictions are used to determine what actions nations and regions should take to prepare for the coming changes.
Scenario-Based Approach (SBA)	Analyzes the implications for temperature increase of specific concentration stabilization levels, concentration pathways, emissions scenarios, or other policy scenarios.
Guardrail Analysis (GA)	Derive ranges of emissions that are compatible with predefined constraints on temperature increase, intolerable climate impacts, and/or unacceptable mitigation costs.
Cost–Benefit Analysis (CBAs)	Include representations of key vulnerabilities or DAI in a cost-optimizing integrated assessment framework.
Cost effectiveness analysis (CEA)	Identify cost-minimizing emissions pathways that are consistent with predefined constraints for GHG concentrations, climate change or climate impacts. Cost-effectiveness analysis involves determining cost minimizing policy strategies that are compatible with pre-defined probabilistic or deterministic constraints on future climate change or its impacts.
Integrated Assessment Models (IAMs)	IAMs aim to combine key elements of biophysical and economic systems into a decision-making framework with various levels of detail on the different sub-components and systems. These models include all different variations on the extent to use monetary values, the integration of uncertainty, and on the formulation of the policy problem with regard to optimization, policy evaluation and stochastic projections.
EX-ACT	EX-Ante Carbon-balance Tool is a tool developed by the Food and Agriculture Organization of the United Nations (FAO) and aimed at providing ex-ante measurements of the impact of agriculture (and forestry) development projects on GHG emissions and C sequestration, indicating its effects on the C-balance3, which is selected as an indicator of the mitigation potential of the project. The tool was built as a response to the increasing interest of agriculture and rural development project designers in

Tool	Description
	quantifying the impact of project activities on biomass and soil C and in integrating significant mitigation effects in project components.
Farmscoper	As part of a Defra funded project, Farmscoper is a tool designed to (i) Quantify diffuse pollution losses occurring on recognisable farm types, (ii) Show a detailed breakdown of pollutant sources and pathways (iii) Quantify the impact and cost of a range of mitigation methods, and (iv) Find cost-effective suites of methods through optimisation
ALU	Agriculture and Land Use National Greenhouse Gas Inventory Software guides an inventory compiler through the process of estimating greenhouse gas emissions and removals related to agricultural and forestry activities. The software simplifies the process of conducting the inventory by dividing the inventory analysis into steps to facilitate the compilation of activity data, assignment of emission factors and completion of the calculations. The software also has internal checks to ensure data integrity. Many governments also have an interest in mitigating greenhouse gas emissions from agriculture and forestry. Determining mitigation potential requires an understanding of both current emission trends and the influence of alternative land use and management practices on future emissions. Our software program is designed to support an evaluation of mitigation potentials using the inventory data as a baseline for projecting emission trends associated with management alternatives.
WetSpa	WetSpa is the acronym for Water and Energy Transfer between Soil, Plants and Atmosphere. A GIS-based distributed watershed model, WetSpa Extension, has been under development suitable for use of flood prediction and watershed management on catchment scale. The model is physically based and simulates hydrological processes of precipitation, snowmelt, interception, depression, surface runoff, infiltration, evapotranspiration, percolation, interflow, groundwater flow, etc. continuously both in time and space, for which the water and energy balance are maintained on each raster cell. Surface runoff is produced using a modified coefficient method based on the cell characteristics of slope, land use, and soil type, and allowed to vary with soil moisture, rainfall intensity and storm duration. Interflow is computed based on the Darcy's law and the kinematic approximation as a function of the effective hydraulic conductivity and the hydraulic gradient, while groundwater flow is estimated with a linear reservoir method on a small subcatchment scale as a function of groundwater storage and a recession coefficient. Special emphasis is given to the overland flow and channel flow routing using the method of linear diffusive wave approximation, which is capable to predict flow discharge at any converging point downstream by a unit response function. The model accounts for spatially distributed hydrological and geophysical characteristics of the catchment and therefore is suitable for studying the impact of land use change on the hydrological behavior of a river basin.
Groundwater Modeling System (GMS)	GMS is the most sophisticated and comprehensive groundwater modeling software provides tools for every phase of a groundwater simulation including site characterization, model development, calibration, post-processing, and visualization. GMS supports both finite-difference and finite-element models in 2D and 3D including MODFLOW 2000, MODPATH, MT3DMS/RT3D, SEAM3D, FEMWATER, PEST, UTEXAS, MODAEM and SEEP2D. Regardless of your modeling needs, GMS has the tool.
Surface Water Modeling System (SMS)	Surface Water Modeling System (SMS) is a comprehensive environment for one-, two, and three-dimensional hydrodynamic modeling. A pre- and post-processor for surface water modeling and design, SMS includes 2D finite element, 2D finite difference, and 3D finite element modeling tools. Supported models include RMA2, RMA4, ADCIRC, CGWAVE, STWAVE, BOUSS2D, CMS Flow, and CMS Wave models. A comprehensive interface has also been developed for facilitating the use of the FHWA commissioned analysis package FESWMS. The TUFLOW numerical model with powerful flood analysis, wave analysis, and hurricane analysis is now supported. SMS also includes a generic model interface, which can be used to support models which have not been officially incorporated into the system.
The Watershed Modeling System (WMS)	The Watershed Modeling System (WMS) is a comprehensive graphical modeling environment for all phases of watershed hydrology and hydraulics. WMS includes powerful tools to automate modeling processes such as automated basin delineation, geometric parameter calculations, GIS overlay computations (CN, rainfall depth, roughness coefficients, etc.), cross-section extraction from terrain data, and many more! With the release of WMS 8.4, the software supports hydrologic modeling with HEC-1 (HEC-HMS), TR-20, TR-55, Rational Method, NFF, MODRAT, HSPF, and GSSHA. Hydraulic models supported include HEC-RAS and Simplified DAMBREAK. 2D integrated hydrology (including channel hydraulics and groundwater interaction) can now be modeled with GSSHA.
Clean Air and Climate Protection Software (CACPS)	Clean Air and Climate Protection Software (CACPS) are used to develop greenhouse gas and criteria air pollutant inventories for government operations, or to create a community-wide emissions estimate. CACPS also allows users to forecast emissions and create an emissions reduction plan. Members of the National Association of Clean Air Agencies (NACAA) or ICLEI - Local Governments for Sustainability should contact ICLEI directly to receive the tool and access to training.
Emission FACtors (EMFAC)	ARB developed the EMFAC (Emission FACtors) model to calculate emission rates from motor vehicles operating in California. The EMFAC model considers all motor vehicles, from passenger cars to heavy-duty trucks, operating on highways, freeways, and local roads in California. EMFAC and OFFROAD, the ARB model that calculates emissions from off-road vehicles, contain emission estimates for carbon dioxide and methane transportation emissions. EMFAC2007 and OFFROAD2007 represent the most current model versions
Climate CHECK	EPA's Climate CHange Emission Calculator Kit (Climate CHECK) estimates a school's greenhouse gas emissions and conceptualizes ways to mitigate the school's climate impact.
ENERGY STAR Portfolio Manager	Portfolio Manager is an interactive energy management tool that allows users to track and assess energy and water consumption across their entire portfolio of buildings in a secure online environment. Local governments can use the tool to create an inventory of greenhouse gas emissions from government buildings, set efficiency investment priorities, identify under-performing buildings, verify efficiency improvements, and receive EPA recognition for superior energy performance.

Tool	Description
Local Government Greenhouse Gas Protocol	ICLEI - Local Governments for Sustainability in collaboration with the California Air Resources Board, The California Climate Action Registry, and The Climate Registry, has developed a draft greenhouse gas protocol for local government operations in the United States. The protocol is a guidance document that provides a framework for consistent quantification and categorization of greenhouse gas emissions at a local government level. A community-wide protocol is in development.
Office Carbon Footprint Tool	The Office Carbon Footprint Tool can assist offices in making decisions to reduce GHG emissions associated with their activities. This tool will allow the user to estimate GHG emissions from a variety of sources, including company-owned vehicle transportation; purchased electricity; waste disposal; and leased assets, franchises, and outsourced activities.
Regional Greenhouse Gas Protocol	EPA is in the process of developing a Regional Greenhouse Gas Inventory Guidance document to address regional inventory needs as multi-county regions and Metropolitan Planning Organizations (MPOs) are becoming increasingly interested in climate change and more regional groups are attempting to inventory their GHG emissions. The methods contained in the guidance document were developed in part by working with inventories created by two regional governments, the Delaware Valley Regional Planning Commission and the Washington Council of Governments. These inventories served as pilot studies, providing methods and indicators that were evaluated for their potential use in other regional settings.
GHG Equivalency Calculator	The GHG Equivalency Calculator translates emissions amounts into terms that are more easily understandable. For example, the calculator translates emissions in metric tons of carbon dioxide equivalent (CO_2e) into "emissions of X number of cars annually" and other metrics.
Personal Emissions Calculator	The Personal Emissions Calculator calculates a rough estimate of an individual or family's greenhouse gas emissions and explores the impact of taking various actions to reduce those emissions.
Emissions & Generation Resource Integrated Database (eGRID)	eGRID contains a comprehensive inventory of environmental attributes of electric power systems including air emissions data for nitrogen oxides, sulfur dioxide, carbon dioxide, and mercury. The data are organized in a series of Microsoft Excel files that local governments can use to find data on emissions from electricity generation within their area.
Green Power Equivalency Calculator	The Green Power Partnership's Green Power Equivalency Calculator can help a local government better communicate a green power purchase to interested stakeholders by translating it from kilowatt-hours purchased into more understandable terms, such as an equivalent number of passenger vehicles, homes, or coal plants.
Power Profiler	Local governments can use this tool to evaluate the environmental benefits of choosing cleaner sources of energy. The Power Profiler is a Web-based tool that allows users to evaluate the air pollution and greenhouse gas impact of their electricity choices. Using only a ZIP code, the tool generates a report describing the characteristics of one's electricity use.
Durable Goods Calculator	The Durable Goods Calculator calculates the GHG and energy benefits of increasing the recycling rates of goods that are disposed.
Landfill Gas Energy Benefits Calculator	The Landfill Methane Outreach Program's Landfill Gas Energy Benefits Calculator estimates direct, avoided, and total greenhouse gas reductions—as well as environmental and energy benefits—for the current year of a landfill gas energy project. For both electricity generation and direct-use projects, reductions of greenhouse gas emissions are derived from capturing and destroying landfill methane.
Recycled Content (ReCon)	ReCon helps companies and individuals estimate life-cycle GHG emissions and energy impacts from purchasing and/or manufacturing materials with varying degrees of post-consumer recycled content.
EnergyPLAN	System analysis of large-scale integration of renewable energy
energyPRO GRID	A transmission system model developed in cooperation with EMD. The model is used for the analyses of transmission grid loads and losses based on geographic distribution of power sources and demands.
COMPOSE	(Compare Options for Sustainable Energy) is a techno-economic energy project assessment model, that allows for the evaluation of user-defined sustainable energy projects in user-defined energy systems allowing for user-selected methodology options, comparing both local and system-wide energy, environmental, and economic consequences.
Energy BALANCE	A simple Excel spreadsheet model. Now made available as part of the local energy planning tool (Energy Planning Tool web-site).

Annex 2. Description of main policy-oriented research tools for desertification studies

Tool	Description
USLE model for soil erosion by water	The Universal Soil Loss Equation (USLE), a model developed by the United states Department of Agriculture (USDA), is the most widely used model to assess the potential of soil to be eroded by water. Many revised versions of USLE, known as RUSLE, appeared and were used by researchers and scientists worldwide. The USLE uses six types of data to eventually calculate annual long term soil loss (kg/ha/year) by water erosion. These are: Rainfall erosivity factor derived from historical rainfall data; Soil erodibility factor; Slope-length gradient factor; Cropping management factor; and Conservation practice. The USLE and RUSLE are currently implemented within GIS environments and using remote sensing to derive their parameters.
DUST_EM model for soil erosion by wind	DUST_EM is a GIS based model with linking code in FORTRAN programming language, originally developed by the University of Guelph, Canada. The model uses the concept of wind threshold shear velocity (u_{*t}) which is the minimum wind force needed to initiate particle movement, thus wind erosion. Accordingly, the model processes many calculations using the inputs from soil, rocks and wind field data to eventually determine, for each grid cell, whether the wind shear velocity (u_{*}) exceeds the threshold wind shear velocity modified by the presence of roughness elements (u_{*tveg}). If the condition is satisfied, then soil erosion is taking place and the model will calculate the total vertical flux (F_{tot}) and the total horizontal flux (q_{tot}) for sand, and the output will be a value of F_{tot} and q_{tot} in $kg.m^{-1}.s^{-1}$ for each grid cell. If the shear velocity (u_{*}) for any grid cell does not exceed the threshold u_{*tveg} this means no soil erosion occurs, and the output value for this grid cell will be zero. The model was tested and adapted to Jordan's condition using ground data, GIS layers and climatic data for Yarmouk basin.
General models of desertification	These are dynamic simulation models that define the indicators for the risk of desertification of a particular region in the long term by merging data of physical and socioeconomic processes. The models are then applied using scores and weights to identify risk of desertification. An example on these models is the MEDALUS model which incorporates climate, soil, vegetation and land use, ground water data and wind erosion maps.
Analogue models	Analogue models make predictions based on analogous situations by comparing impacts and situation of area under consideration with similar conditions in countries or areas with similar conditions, i.e. building on experience at one site with those at similar sites elsewhere. These models can be developed from literature searches, site visits, or from expert opinion. Regional and global networks provide excellent examples that can be used as analogue models.
GIS tools	GIS is a computer based system to aid in the collection, storage, analysis, output, and distribution of spatial data and information. The use of GIS developed in the last two decades and many applications were published through the peer reviewed journals. The most important use of GIS is in natural resources management (water, land and environment). GIS strength is mainly attributed to its abilities to analyze spatial patterns, derive hydrologic maps from DEMs and overlay of different digital layers to derive new ones. The most commonly used models of GIS are the vector model which is used in overlay analysis and in representing discrete features and the raster model which is used to represent satellite images and maps of continuous features. Both models are used interchangeably to apply GIS tools for mapping and assessment. The most commonly used software is ArcGIS of ESRI.
Remote sensing data and tools	Earth observation satellites provide a wide set of remote sensing data at high temporal, spectral and spatial resolutions. Daily data of MODIS at 1 km, 500 m and 250 m are available for researchers and can be downloaded for free from the web. Also, medium resolution satellites of Landsat TM and ETM+ are available for historical periods. New generations of high spatial resolutions are expected to be launched in the coming future. Currently, the highest resolution for commercial use is 1 foot (GeoEye 2). These sets of optical remote sensing data (Passive systems) provide digital layers of land use/cover, vegetation indices, brightness temperature, albedo and other variables that can be directly related to desertification research. The second dataset of remote sensing is the microwave data (Active systems) of RADAR and Synthetic Aperture RADAR SAR which provides data on surface roughness, objects geometry and soil moisture contents. The use of both active and passive remote sensing data by research community became extensive and provided important spatial datasets for mapping, monitoring and assessing rates of desertification. The strength of remote sensing tools is the use of digital image processing software (e.g. ERDAS, ENVI, Geomatica) that saves time and enables change detection with high accuracy.

Annex 3. Brief description of main policy-oriented research tools for biodiversity studies

Tool	Description
Bioprespecting	A search for useful organic compounds in microorganisms, plants, and fungi that grow in extreme environments, such as rainforests, deserts, and hot springs.
Biota	Vegetation zones and structure, animal populations and distribution, and special features including characteristic or rare/endangered species vegetation zones and structure, animal populations and distribution, and special features including characteristic or rare/endangered species.
Cladistics	The study of the pathways of evolution. In other words, cladists are interested in such questions as: how many branches there are among a group of organisms; which branch connects to which other branch; and what the branching sequence is. A tree-like network that expresses such ancestor-descendant relationships is called a cladogram.
Cryopreservation	A process where cells or whole tissues are preserved by cooling to low sub-zero temperatures, such as (typically) 77 K or −196 °C (the boiling point of liquid nitrogen).
Diversity index	A mathematical measure of species diversity in a community? Diversity indices provide more information about community composition than simply species richness (i.e., the number of species present); they also take the relative abundances of different species into account.
DNA sequencing	DNA sequencing is the process of determining the nucleotide sequence of a given DNA fragment. The sequence of the DNA of a living thing encodes the necessary information for that living thing to survive and reproduce
Dynamic models	Models incorporate the degree to which sites have shifted in climate space over time.
Ecogeographical variables (EGV)	A type of data that describe environmental, topographical and anthropic parameters of the study area.
Ecological-niche factor analysis (ENFA)	An analysis used to compare the distribution of the Eco-geographical variables (EGV) between the presence data set (species distribution) and the whole area.
Eco tourism	A form of tourism involving visiting fragile, pristine, and usually protected areas, intended as a low impact and often small scale alternative to standard commercial tourism. Its purpose may be to educate the traveller, to provide funds for ecological conservation.
Forest certification schemes	**1** An instrument to promote sustainable forest management, forest certification is a market driven tool that ensures forest sustainable management in one hand and provides premium price to the management of forest products on the other hand, this certificate enables consumers to express environmental concern with a choice to choose certified forest product from market.
Informant Consensus Factor (ICF)	Factor used in ethno-botanic studies particularly medicinal plant species used in folk medicine. Pair estimating deriving qualitative information about pattern-based stochastic spatial models for population.
Nucleic acids sequencing	Such as DNA and RNA, are un branched polymers, this specification is equivalent to specifying the sequence of nucleotides that comprise the molecule and consequently the species.
Null model	A model to estimate probability of colonization and extinction.
Land use and land cover	Data provide essential information for environmental management and planning.

(LULC) data	
Phenetics	A Study of relationships among a group of organisms on the basis of the degree of similarity between them be that similarity molecular, phenotypic, or anatomical. A tree-like network expressing phenetic relationships is called a phenogram.
Phylogenetics	The study of evolutionary relatedness among groups of organisms (e.g. species, populations) discovered through molecular sequencing data and morphological data matrices.
Polyploid complex	A group of interrelated and interbreeding plants that also have differing levels of ploidy that can allow genetic exchanges between unrelated species.
Remote sensing by Advanced Very High Resolution Radiometer (AVHRR)	An operational satellite carrying advanced very high resolution sensor. The primary purpose of these instruments is to monitor clouds and to measure the thermal emission (cooling) of the Earth. These sensors have proven useful for a number of other applications, however, including the surveillance of land surfaces, ocean state, aerosols, etc. AVHRR data are particularly relevant to study climate change and environmental degradation because of the comparatively long records of data already accumulated (over 20 years)
Remote sensing using Normalized difference Vegetation Index (NDVI)	An index used for monitoring vegetation cover. NDVI was one of the most successful of many attempts to simply and quickly identify vegetated areas and their "condition," and it remains the most well-known and used index to detect live green plant canopies in multispectral remote sensing data. Once the feasibility to detect vegetation had been demonstrated, users tended to also use the NDVI to quantify the photosynthetic capacity of plant canopies
Resilience	The capacity of a system to tolerate disturbance without collapsing, to withstand shocks, to rebuild itself when necessary, and to improve itself when possible, means also being able to be flexible and also about the ability to be able to adapt.
Shannon index (*H*)	Also known as Shannon's diversity index, the Shannon-Wiener index, the Shannon-Weaver index, the Shannon-Weiner index and the Shannon entropy, this measurement takes into account subspecies richness and proportion of each subspecies within a zone.
Simpson Index (D)	A measurement that accounts for the richness and the percent of each subspecies from a biodiversity sample within a zone. The index assumes that the proportion of individuals in an area indicate their importance to biodiversity.
Static model	A model to estimate turnover probabilities as a function of the distance from a site to the niche centroid.
Species richness (S)	The number of species present in a sample, community, or taxonomic group.
Species-area curve	A relationship between the area of a habitat, or of part of a habitat, and the number of species found within that area.
SWOT analysis	A strategic planning method used to evaluate the Strength, Weaknesses/Limitations, Opportunities, and Threats involved in a project or in a business venture.
Thematic Mapper (TM)	Earth observing sensors feature seven bands of image data (three in visible wavelengths, four in infrared) most of which have 30 meter spatial resolution. TM is a whisk broom scanner which takes multi-spectral images across its ground track. It is a useful tool in the study of albedo and its relationship to global warming and climate change.

UNDP is the UN's global development network, advocating for change and connecting countries to knowledge, experience and resources to help people build a better life. We are on the ground in 166 countries, working with them on their own solutions to global and national development challenges. As they develop local capacity, they draw on the people of UNDP and our wide range of partners.

Empowered lives.
Resilient nations.

For more information
United Nations Development Programme
United Nations University
Queen Rania Street
Building No. 274
Jordan
Email: registry,jo@undp.org.
Website: www.undp-jordan.org