

ARAB

MILLENNIUM ECOSYSTEM ASSESSMENT

SUMMARY FOR POLICY MAKERS



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United Nations
Environment Programme
(UNEP)



Centre for Environment and
Development for the Arab Region and
Europe (CEDARE)

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Produced by

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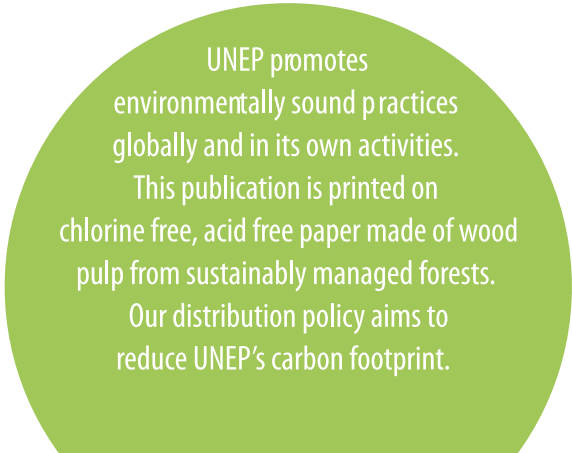
Cover design: Dalia El Shamy

Cover photo: Ministry of Energy, Mines, Water & Environment, The Kingdom of Morocco

Printing: Progress Press Co. Ltd., Malta

This version is available via the following website:

www.unep.org/dewa/westasia



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In Collaboration with:



Presidency of Meteorology and
Environment (PME)



Ministry of Energy, Mines, Water &
Environment, The Kingdom of Morocco



Suez Canal University

FOREWORD

The Arab Region Sub-Global Assessment began as an associate assessment of the Millennium Ecosystem Assessment (MA). Its remit was to go beyond the global MA and pave the way for the adoption of integrated assessments in the Arab region. Three sites, representing the dominant ecosystems of the region, were selected as the focus of the study – the Sinai Peninsula in Egypt; the Tafilalet Oasis in Morocco; and the Assir National Park in Saudi Arabia.

This Arab Millennium Ecosystem Assessment Synthesis Report integrates the findings of these three assessments. It highlights the commonalities and differences between them and how they relate to the national, regional and global ecosystem. The report also looks at some of the more detailed findings for selected ecosystem services.

The report shows that, despite geographical differences, the three sites bear significant commonalities in a number of key areas, notably: hot, dry and continental climate patterns, water scarcity, resource depletion, land use change, desertification, soil erosion, sand encroachment, overpopulation and urbanization, poverty and unemployment.

The total population of Arab countries will be about 395 million by 2015. This rapid increase, together with changing consumption patterns, puts excessive pressure on fragile land. The report recognizes this



and shows that environmental degradation and diminishing ecosystem services severely impact human well-being and are direct causes of poverty and inferior quality of life. It identifies the most common ecosystem services as water, agriculture, grazing and raising cattle, aromatic and medicinal plants and biodiversity. It also identifies the most significant drivers of ecosystem change as water scarcity, land use change, the impact of extractive industries, and governance.

Water scarcity is a serious concern and the most influential driver on ecosystem services. While the population in the Arab



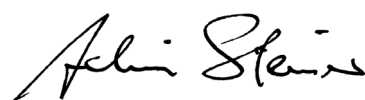
region accounts for five per cent of the world population, the region is the source of less than one per cent of the world's renewable fresh water. Water deficits and poor water quality jeopardize human security at many levels, and additional water shortage and pollution remain one of the biggest challenges.

The three assessments had a strong input from local inhabitants, who are inextricably linked to the conditions of the surrounding environment. The report provides abundant examples of how local knowledge has built a valuable body of information which reflects people's ability to combat environmental hardship. Local plants, for example, are used to augment food supplies, as is the case in both El Maghara and Tafilalet.

The report also acknowledges the many positive developments that have occurred in the Arab World since the Stockholm Conference. However, it reveals that these still fail to realize the aims of the Brundtland report, and only the GCC countries are considered likely to reach the MDGs by 2015. Critical to achieving these goals, the report emphasizes the need for a new paradigm: one that recognizes that environmental sustainability is the foundation upon which economic health depends. A number of interventions are proposed, occurring in three spheres of action: i) regenerating the ecosystem; ii) human resources development, which includes both social and economic interventions; and iii) institutional reforms.

Progress towards sustainable development is vitally dependent upon sound decision making. It is my hope that this report will not only meet the needs of decision-makers, but will help promote sound ecosystem management practices and sustainable development strategies to improve ecosystems and human well-being in the Arab region.

I would like to extend my thanks to the Government of the Kingdom of Saudi Arabia for providing initial financial support for this report, as well as the Center for Environment and Development for the Arab Region and Europe (CEDARE) for their continuous support and professionalism. I would also like to thank all of the authors and contributors for their painstaking work in realizing this important publication.



Achim Steiner

United Nations Under-Secretary General and
Executive Director, United Nations Environment
Programme

PREFACE

Ecosystems matter! The Arab region, this vast and cherished homeland, has been blessed with great wealth, its own unique natural resources, and has enriched us with the glory of its ancient civilizations.

While our region faces many interrelated environmental challenges, at the same time, they represent attractive opportunities for development. Partnerships, progressive thinking, scientific, technological and evidence-based knowledge, as well as strong determination and confidence, are key to meeting these challenges and reaffirming our commitment to a unified Arab vision for the environment, in line with global environmental thinking and action.

The Arab region's ecosystems, - our very life support systems - are subject to rapid depletion, posing a significant challenge to sustain future generations. Today's technology and knowledge can considerably reduce the damaging human impact on ecosystems. That said, they are unlikely to be fully deployed until ecosystem services cease to be perceived as free and limitless, and their full value is taken into account.

It has been an honour to collaborate with the United Nations Environment Programme (UNEP), Presidency of Meteorology and Environment (Kingdom of Saudi Arabia), Ministry of Energy, Mines, Water and



Environment (Morocco), and the Suez Canal University (Egypt), in the production of the Arab Millennium Ecosystem Assessment Report.

The assessment examines the environment through the framework of ecosystem services, to identify how changes in ecosystems influence human well-being and to provide information in a form that decision-makers can weigh, alongside other social and economic information.

Many messages emerge from the report. These are rooted in three main pillars: Sustainability, Leadership and Innovation:



1. Sustainability: teaming up with countries and institutions to address, - in parallel - environmental, economic, social and governance concerns as an integral part of policies and strategies for balanced and inclusive growth.
2. Leadership: empowerment of human capital, particularly since this region is blessed with human resources of inestimable value. People's involvement in the decision-making process, ownership of the problem and sharing the benefits and knowledge, yield positive synergies - the backbone for environment-friendly resilient communities of the future.
3. Innovation: advancement of people and societies through knowledge-sharing, reshaping traditional approaches, progressive environmental governance, creative solutions and circulation of best practices.

The backbone of our credibility is action. This lies in achieving tangible results to enrich our accomplishments - and these are many - and in dealing scientifically, practically and collectively with what lies ahead.



Nadia Makram Ebeid

Executive Director
Centre for Environment and Development for the
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Arab Millennium Ecosystem Assessment Process

The Millennium Ecosystem Assessment (MA) is an international initiative launched in 2002. One of the central issues of the MA is human well-being and the interrelationship with the environment, represented by its goods and services and quality of human life. The MA responds to government requests for information received through a number of international conventions and the business community, the health sector, non-governmental organizations, and indigenous peoples. It is designed to meet the needs of decision makers and the public for scientific information concerning the consequences of ecosystem change for human well-being and options for responding to these changes. It is anticipated that the MA will be repeated every 5-10 years.

Assessments at sub-global scales are essential as ecosystems are highly differentiated in space and time. Therefore, sound management requires rational local planning and action. The Arab region sub-global assessments started in the latter stage of the MA as an associate assessment. As such, the Arab region sub-global assessment was intended to go beyond the global MA.

Three sites were selected to be the focal sites for the Arab Millennium Ecosystem Assessment: Sinai Peninsula, Egypt; Tafilalet Oasis, Morocco; and Asir National Park, Saudi Arabia. Sub-global assessment reports have been formulated to each case study independently.

The selection of these areas as assessment sites was based on a number of factors that include a number of biodiversity-rich and special ecosystems that undergo changes and transitions affecting the environmental integrity and the well-being of its inhabitants.

The Arab MA is a synthesis report that sheds light on the ailing environmental conditions and the root causes of these conditions, as a prelude to prompt corrective plans and actions. It also intended to generate problem-solving knowledge that facilitates action on critical issues of sustainable development and protection of the environment through the design of institutional arrangements that foster the generation, collection, analysis, diffusion, and use of scientific knowledge for the sustainable use of ecosystems.

The objectives of the Arab MA include:

- To meet the needs of and communicate the assessment information to decision-makers;
- To build capacity to undertake integrated assessments of ecosystems of key partners;
- To help develop and test methodologies for integrated multi-scale ecosystem assessments and methodologies for integrating local and “scientific” knowledge;
- To promote widespread adoption of integrated assessment approaches in the region;





Figure 1 Locations of Arab MA

Source: Adapted from UNEP, 2010

Stakeholder Engagement

The Arab assessments have adopted a multidisciplinary approach that addresses issues from the biophysical, technical, socio-economic, cultural, institutional, and policy perspectives. They have also stimulated interactions among researchers, policy-makers, and community leaders. Local inhabitants, decision-makers at various tiers, scientists, NGOs and other pressure groups, and laymen have equal footing in an ecosystem assessment.

The three assessments of the Arab MA have had a strong reliance on local inhabitants who bear the real burdens, and are inextricably linked to the generic conditions of their surrounding environment. Information driven from stakeholders at all levels is the backbone of assessment construct and the nuclei that scientists and others may delineate on.

Techniques Used in the Assessment

A number of techniques were used in each of the assessments. Geographic Information System (GIS), and Remote Sensing (RS) were the most commonly spatial analytical tools used in the three assessments. In addition to the following techniques:

- Sets of biophysical and socio-economic indicators were also used as tools for assessing the relationship between ecosystems and human well-being. Indicators were used to assess the quality of environmental attributes and services and to gauge the degradation of some of these services.
- The DPSIR analytical framework (Driving forces of change - Pressures - State - Impact - Responses). It used to analyse the interactions between society and the environment through environmental

indicators. The framework allows carrying out of environmental evaluations, providing information about the elements that are shaping the state of the environment.

1 Critical Thresholds

The Arab region is endowed with a diverse set of ecosystems that include dryland, forest, mountain, cultivated, coastal and marine ecosystems as well as urban ecosystems. Ecosystems in the region offer their inhabitants the natural resources that are used in services that the economy depends on to a great extent. Generally, most of the Arab region ecosystems are facing various challenges due to climate change, natural events and anthropogenic activities that include pollution, population growth, urbanization and over-harvesting.

Consequently, the deterioration of an ecosystem causes extreme poverty in communities that depend on natural resources for their nutrition, employment and income generation. Accordingly, Arab countries need to develop evidence-based policies that can improve ecosystem sustainability and conserve its services for future generations.

The importance of ecosystems lies in the fact that they provide numerous interrelated services. Provisioning services, such as food and water, are the most dominant in the three assessments. These services also include regulating services such as flood

and disease control; cultural services such as spiritual and recreational benefits; and supporting services such as nutrient cycling that maintain the conditions for life on Earth. Common ecosystem services in the three assessments include water, agriculture, grazing and raising cattle, aromatic and medicinal plants and biodiversity.

Despite the spatial differences between the three assessments, and the various dominant traits of each, the three assessments seem to bear some significant commonalities. The assessments indicated that the problem is environmentally sustaining the development of Tafilalet, Asir and El Maghara. There are four main categories of triggers for action: economic, social, environmental and institutional, as follows:

Economic

Ecosystems provide services that support both production and consumption. Both Tafilalet and El Maghara are subject to scramble for resources. Forest and terrace agriculture, agricultural and grazing land, coastal and marine ecosystems in Asir, Saudi Arabia, sustain the livelihoods of the locals.

The assessments indicated that several economic drivers affect the ecosystems of the three sites. The high unemployment rate in the Arab region estimated at 48 per cent of young people between the ages of 15 to 24 (AMF 2011) makes it difficult to alleviate poverty, negatively affecting

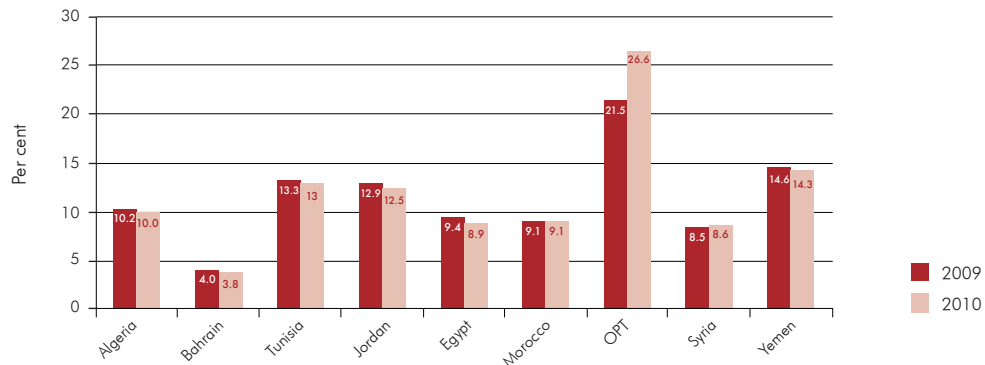


Figure 2 Unemployment Rates in Selected Arab Countries (2009-2010)

Source: AMF, 2011

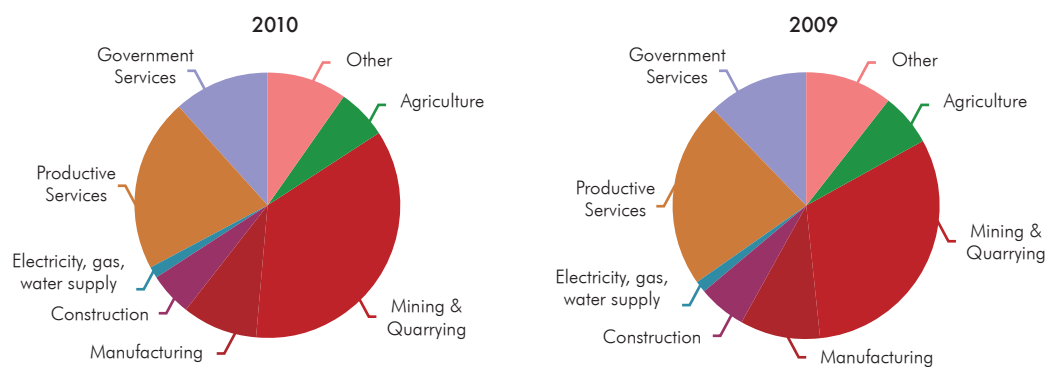


Figure 3 Structure of Arab Gross Domestic Product by Main Economic Activity

Source: AMF, 2011

the sustainability of the ecosystems in the area. The economic activities, such as manufacturing and extractive industries and agriculture, constitute a crucial part of the Arab region GDP. These activities, alongside others, contribute to the impacts made on natural resources and their sustainability.

Social

Most of the inhabitants of El Maghara and Tafilalet are poor and lack physical infrastructure, such as safe drinking water, wastewater collection and treatment, integrated schemes for solid waste collection and disposal, as well as not having access to proper educational facilities and health

care units. These social factors constitute pressures on the local ecosystem. Population growth, which is expected to reach 598.5 million by 2050 in the Arab region (Gelil, I.A. 2011), increases the pressure on its ecosystems. Poverty and education also have impacts on ecosystems, as poor and illiterate communities have very limited awareness of the importance of sustainable management of natural resources. Thus, overexploitation of ecosystem services occurs.

Environmental

The assessments of Asir, El Maghara and Tafilalet indicate common environmental issues. Water scarcity, hot arid climate, loss of biodiversity, and drought and desertification are among the shared environmental issues and problems. These harsh environmental conditions, in addition to population growth,



Impact of Housing and Road Construction on Terrace Agriculture System, Asir, Saudi Arabia

and the need for natural resources and economic growth, accelerate the process of impoverishment. The result is a number of issues of economic and social costs.

Institutional

Problems may arise within an awkward institutional framework. Most of the decisions made within public bodies do not consider long-term objectives and are often in pursuit of the “quick fix”, and thus do not consider fundamental alternatives. In contrast, in private sector companies, decisions are made to maximize profit and minimize costs. Often, private sector companies have the “agility” to respond to changes within and outside the company. For these reasons, private sector companies go beyond the State and the Market. In addition, Asir, El Maghara and Tafilalet are home to Bedouins, who have a rich culture, and whose morals, ideals and social values have to be respected.

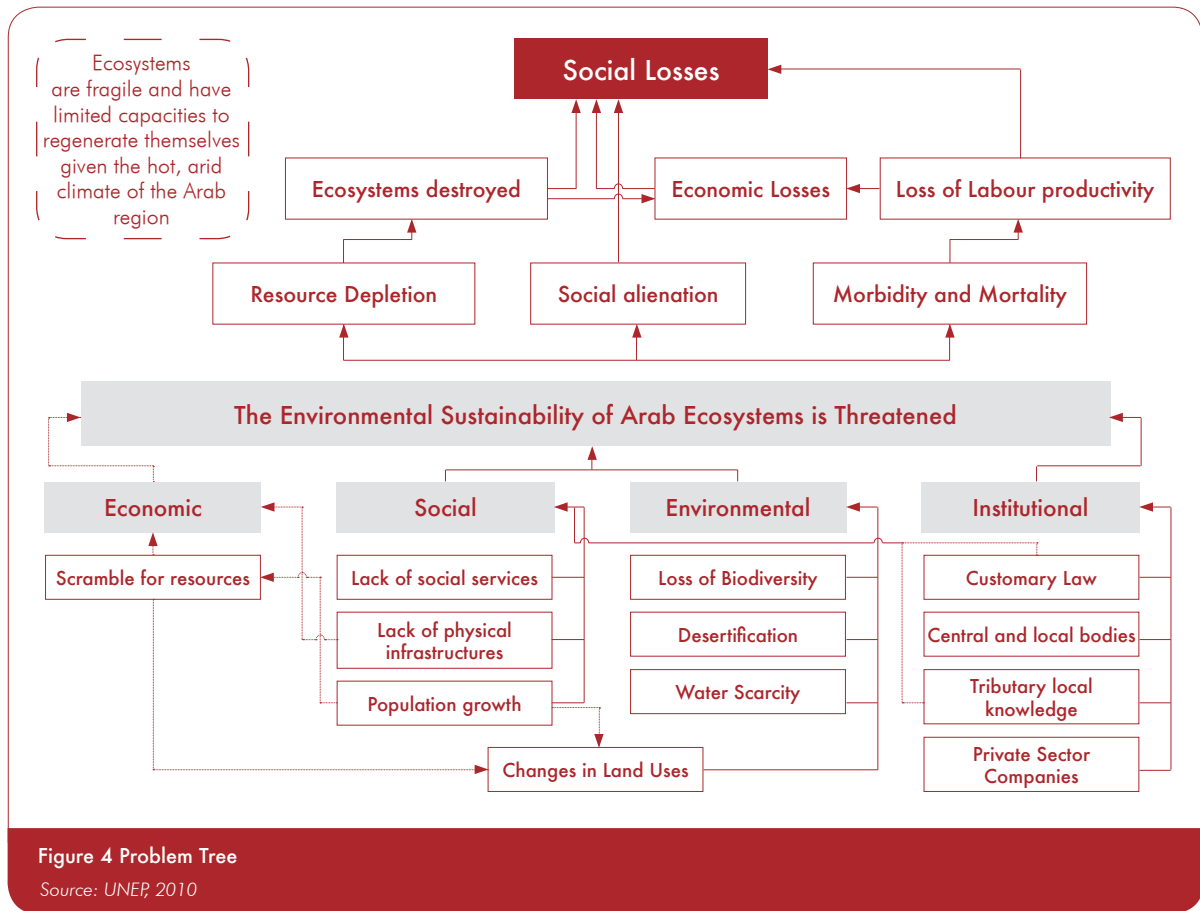


Mohamed Tawfic

Bedouin Ladies Fetching Water at El Maghara, Sinai, Egypt

Source: UNEP, 2010





2 Implementation of Existing Policy Responses Requires Institutional Transformation

Often, problems arise within the institutional framework. In many cases, public institutions do not advertise planned action in advance in order to avoid opposition. The lack of clear frameworks for law enforcement or implementation of action plans, as well as lack of monitoring and reporting on the status of the ecosystem or reliable records, are all factors behind the failure of ecosystem

protection, despite the existence of policy responses in the study areas. These institutions do not consider long-term objectives; unlike sustainable development, which by nature is long-term. Decision-makers at public agencies are often reluctant to consider fundamental alternatives.

3 Existing Responses in the Case Study Areas

Most of the current policy responses in the case study areas are sectorial with technical interventions and supportive measures. The levels of implementation of these responses differ from one case study to another, according to the institutional action towards environmental protection.

El Maghara

Through the assessment, it was found that the area embraces a unique and biodiversity rich ecosystem that undergoes changes that affect the environmental integrity and well-being of the inhabitants. There is great potential to improve the area's situation considerably. For example:

- The Egyptian strategy and action plan for protecting biodiversity;
- Action plan for combating desertification and managing drought; and
- Many other proposed responses, such as community based responses using indigenous knowledge to adapt to local circumstances and needs, and existing proposals for policy responses which consider the role of international and national agencies in the improvement of these areas.

However, despite these available potentials, there were no clear records of past or ongoing attempts to protect the ecosystem.



Syed Mazhar Hasan/www.panoramio.com

Asir Mountains, Saudi Arabia

Asir National Park

The area is characterized by harsh climatic conditions and limited natural resources of water, soil and vegetation cover. It contains one of the most important ecological hotspots in the Arab region. It also includes a combination of four ecosystems: mountain, coastal, forest, and marine ecosystems.

Public institutions in Saudi Arabia have undertaken the following interventions and implementation of laws towards the protection of the ecosystem and the well-being of its inhabitants:

- Forest conservation: Preparation of National Forest Strategy (NFS) and National Forest Programme (NFP). In 2000 a Royal Decree was issued banning issuance of any licenses for wood collection or charcoal-making for five years, as well as the import of firewood and charcoal from abroad.

- Capacity building: The Presidency of Meteorology and Environment (PME) established a regional training centre in Al-Soda to train Saudi graduates in the field of environmental management.
- Implementation of an environmental sustainability approach through the promotion of the Public Private Partnership (PPP). For example, the Raydah Reserve which provides one of the few intact examples of virtually pristine escarpment juniper woodland, and serves as a habitat for high density south-west endemic and near endemic Arabian bird species. The inhabitants of Raydah and As-Suqah village (members of the Rejal Al-Ma and Baalahmer tribes), private sector companies in the field of tourism, together with the local administration at Abha and the central body that is the Ministry of Agriculture, Department of National Parks which administers ANP, are engaged in the administration and management of the park - an example of a collaborative effort toward environmental sustainability for the benefit of the locals and future generations.
- Water conservation interventions: construction of dams and collection and storage of rainwater which is used for irrigation. Desalination plants are contracted to produce potable water.

Tafilalet

Tafilalet is an intensively cultivated area with a heavily dry climate. It provides environmental functions and has a multitude

of goods and services of social, ecological and economic nature. It possesses the assets and potentialities that are the basis for development of several human activities, such as agriculture, tourism, handicraft and industry. However, these potentialities are located in a fragile environment.

Facing this situation which never ceased deteriorating, sectorial policies of correction were undertaken via the projects of preservation restoration and rehabilitation of the agro-ecological systems: protection of productive heritage, pastoral improvement and economic development actions. However, efforts remain limited if compared to the gravity and complexity of the situation. Some of the responses are:

- Improvements of land productivity: The Regional Office of Agricultural Investment of Tafilalet organized rangelands and the grazing process.
- Enforcement of the sustainable approach through capacity building: The Regional Office of Agricultural Investment of Tafilalet established 17 agricultural cooperatives for 4 450 farmers, raising their awareness and training them on the sustainable use of natural resources, and distributed barley in times of drought and planting crops.
- Date-producing palm protection. The government of Morocco passed Law No. 06-01 in 2007, associated with a bundle of interventions, such as assistance on producing and packing dates. The assistance extended to

other crops and agricultural activities, such as the production of olives and beekeeping. The latter initiatives did not only sustain the use of natural resources but also sustained the livelihoods of the inhabitants.

- Water conservation interventions: the government responded with a number of legal and technical interventions. An example of these legal measures is Law 10-95 whose regulations include measures to induce the rational use of water by reducing consumption, and protecting fresh water resources from pollution. The government provides up to 60 per cent of the cost of projects for modern on-farm irrigation techniques, such as drip irrigation. The depletion of surface water during recent years has prompted the Regional Office of Agricultural Investment of Tafilalet to invest more in managing floodwaters by building hydraulic facilities along rivers. In line with these technical interventions, the Regional Office of Agricultural Investment of Tafilalet has embarked on rehabilitating the hydro-agricultural infrastructure, and will probably augment it by establishing a hydraulic basin agency in Tafilalet – an example of a quasi-integrated intervention - as linkages to other aspects such as biodiversity are not clear.
- In order to achieve the MDGs, Morocco has implemented a number of cross-sectorial initiatives, of which some macro-economic projects took place in the region of Tafilalet. These responses are more



*Ministry of Energy, Mines, Water & Environment,
The Kingdom of Morocco*

Oughrou, One of the Traditional Methods of Irrigation Tafilalet, Morocco

Source: UNEP, 2009

integrated because they involve many players and various economic sectors. However, the real outcomes of these initiatives are not clear for a number of reasons, such as idle trickle-down mechanisms responsible for equitable distribution of wealth and dividends of development. Furthermore, the long-term impacts of these initiatives, both social and environmental, might not be properly assessed as governmental institutions tend to heavily discount the future.

4 Shifting the Policy Focus

Existing policy responses for sustaining and conserving the ecosystem are often sporadic and executed with little synergy due to lack of framework for action. Nevertheless, if these laws

and responses are enforced, the environment cannot only be protected by command and control, there are other tools needed but not limited to, economic instruments, financial mechanisms, environmental education and training.

The solution for the environmental sustainability of the study areas is to induce institutional transformations within which the current problems resulted. The solution rests on ecosystem awareness campaigns, empowerment of natives, capacity building and the cooperation and coordination between the private sector, public sector and inhabitants in the formulation and implementation of development plans. During the policy formulation process in the environmental planning field it is important to consider the following three integrated responses:

1. Monitoring, information generation and knowledge sharing:

Baseline assessments, such as the local MA assessments covered in this report monitor the improvement or deterioration of environmental conditions in any given site due to interventions or lack thereof. This requires technical capacities for monitoring the ecosystem(s), inferring the linkages between the different variables and parameters, and then computing the needed indicators. The collected data is necessary for defining the problem in terms of causes and consequences, thus supporting decision making and raising awareness.

2. Corrective and/or preventive measures:

These are interventions that stakeholders have executed in an attempt to improve conditions, and/or to prevent further degradation.

3. Supportive measures:

These are measures needed to sustain the two above measures. There is a wide range of supportive measures including, but not limited to, raising awareness, education and training, economic and financial instruments, institutional transformations, and command and control.

5 Proposed Structure for Policy Responses

Proposed responses occur in three spheres of action: a) regenerating the ecosystem; b) human resources development, which includes both social and economic interventions; and c) institutional reforms. Under each sphere there are a number of interventions proposed in three different, but complementary, components: information and monitoring measures; corrective, preventive actions; and supportive procedures to assure the successful attainment of the sub-goals of each component.

A. Regenerating the Ecosystem

It includes a set of policies and interventions designed for the rehabilitation of the deteriorated ecosystem of the study areas. Several steps could be taken towards sustainable development ranging from sound management of resources and wastes to adaption to climate change.

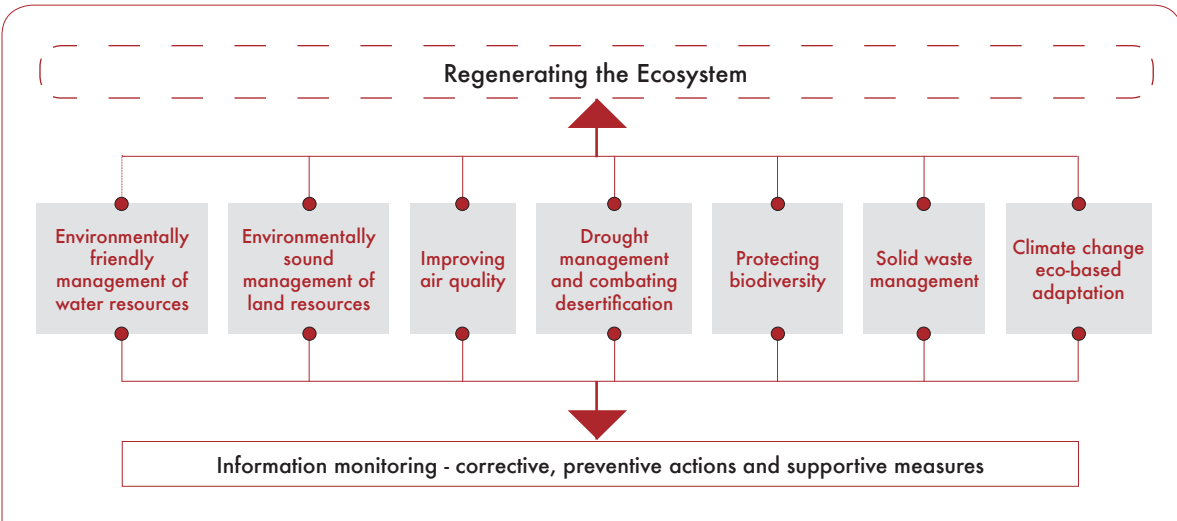


Figure 5 Regenerating the Ecosystem Structure

B. Developing Human Resources

Achieving sustainable development is political - it requires major institutional transformations, and cannot be done without political acceptability. The paradigm shift to sustainable development is sustainable human development, which rests on expanding people’s choices and capabilities by forming social capital. Sustainable development, therefore, starts with people, and will occur only when people are in charge of their future. Achieving sustainable human development in Tafilalet, ANP and El Maghara will require good governance, which will result from institutional transformation, but it also requires specific steps with respect to the development of human resources. These steps involve poverty alleviation, extending social services, and achieving economic growth that is sustainable.

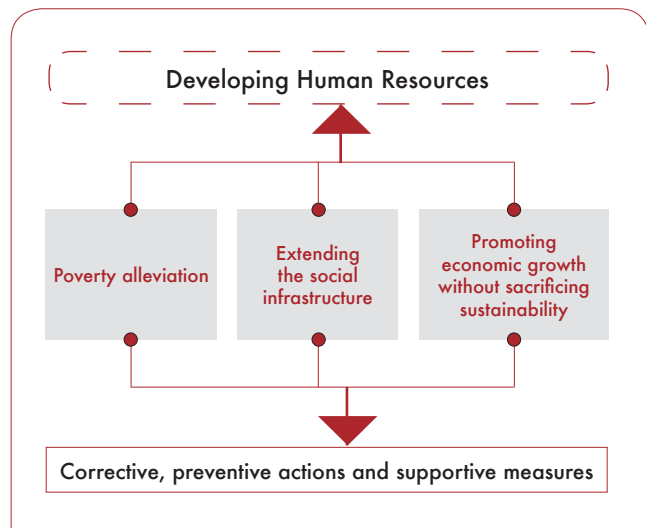


Figure 6 Developing Human Resources Structure

C. Transforming the institutional framework

Institutional transformation is needed for the implementation of effective policies and frameworks needed to achieve integrity

and sustainability of the ecosystem. Usually, as was previously stated, policy making in many Arab countries to date has largely been based on the sectorial approach. This has resulted in fragmented economic, social, and environmental policies. Issues

such as poverty, unemployment, health, and the environment, have been addressed independently with little consideration to the interrelationships among these issues and their causes and solutions.

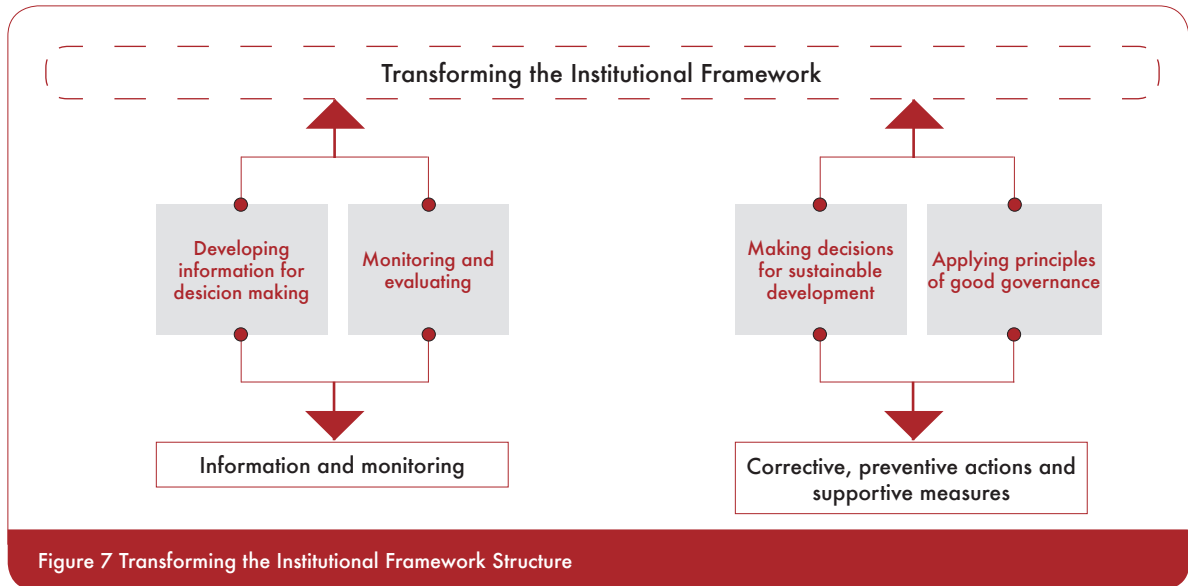


Figure 7 Transforming the Institutional Framework Structure

Figure Sources

Figure 1 Locations of Arab MA

UNEP (2010). Millennium Ecosystem Assessment. *Ecosystem Services and Human Well-being: El Maghara, North Sinai, Egypt*. UNEP, Malta

Figure 2 Unemployment Rates in Selected Arab Countries (2009-2010)

AMF (2011). *The Joint Arab Economic Report: Arab Monetary Fund*

Figure 3 Structure of Arab Gross Domestic Product by Main Economic Activity

AMF (2011). *The Joint Arab Economic Report: Arab Monetary Fund*

Figure 4 Problem Tree

UNEP (2010). Millennium Ecosystem Assessment. *Ecosystem Services and Human Well-being: El Maghara, North Sinai, Egypt*. UNEP, Malta

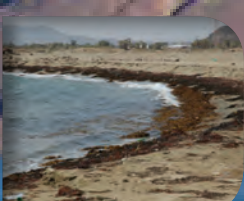
Photo Credit

Page 12: Bedouin Ladies Fetching Water at El Maghara, Sinai, Egypt/Mohamed Tawfic

Page 12: Impact of Housing and Road Construction on Terrace Agriculture System, Asir, Saudi Arabia/PME

Page 14: Asir Mountains, Saudi Arabia/Syed Mazhar Hasan/www.panoramio.com

Page 16: Oughrou, One of the Traditional Methods of Irrigation Tafilalet, Morocco/Ministry of Energy, Mines, Water & Environment, The Kingdom of Morocco



Humanity has always relied on the services provided by the biosphere and its ecosystems. The demands for ecosystem services are now so great that trade-offs among services have become the rule. Human well-being is affected by gaps between ecosystem service supply and demand, and also by the increased vulnerability of individuals, communities, and nations.

The **Arab Millennium Ecosystem Assessment** focuses on ecosystem services, the consequences of changes in the ecosystem on human well-being, and the consequences of changes in the ecosystem on other forms of life on earth. This report is based on a synthesis of three selected site assessments: Sinai Peninsula, Egypt; Tafilalet Oasis, Morocco; and Asir National Park, Kingdom of Saudi Arabia. One of the central issues of the Arab MA is the interrelationship between the environment and human well-being, represented by its goods and services and people's quality of life. The assessment intends to generate problem-solving knowledge that facilitates action on critical issues of sustainable development and protection of the environment through the design of institutional arrangements that foster the generation, collection, analysis, diffusion, and use of scientific knowledge for the sustainable use of ecosystems.

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