

CHAPTER

5

SCENARIOS

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Main Messages

Ecosystem deterioration in the case study areas is an outcome of a set of key drivers including governance efficiency, economic activities, and management of natural resources, accessibility, and available services.

The task of reversing the negative impacts of human induced activities and to make the transition to sustainability requires knowledge of consequences of various policy actions.

To understand the potential impacts of future actions it is important to analyze the complex social, economic and ecological process.

Analysis of future scenarios provides a structural framework for potential long-term trends.

The future state of the environment in the Arab region depends on the type of choices and actions that have or have not been taken.

Scenario Analysis is used to develop an understanding of the requirements to achieve sustainability. Exploring various future actions unveil the potential policy challenges.

Drawing future scenarios highlights the problem of ecological sustainability, recommends strategies, better transitions and leads to the understanding of the implications of each action.

Assessment of the driving forces has shown that in all scenarios economic activities will increase, increasing the chances for job opportunities and declining poverty rates. This decline varies according to the governance efficiency in implementation of laws and capability to solve issues. In the presence of economic activities, scenarios that are ruled by inefficient governance show a further degradation in natural resources, especially water, land and biodiversity. Social sustainability and human welfare only exists in scenarios with high governance efficiency and considerate investors.

5.1 INTRODUCTION TO SCENARIOS, AND DEALING WITH UNCERTAINTY

Scenarios are effective tools for evaluating environmental potential problems and suggesting best policies to resolve them. They provide a structured approach to address uncertainties and complexity of environmental systems. Scenarios can describe how the future may unfold, based on a coherent and consistent set of assumptions about key driving forces, their relationships, and their implications for ecosystems (UNEP 2005a). Scenarios also serve different purposes, such as support of scientific investigation and research, education, collaborative learning processes and decision processes and strategic planning.

Based on the Sub-Global Millennium Ecosystem Assessment reports, this chapter synthesizes the future scenarios of the three case study reports located in El Maghara, Egypt; Tafilalet, Morocco; and Asir National Park, Saudi Arabia.

The assessment aims to meet the needs of users and stakeholders in the areas in which they were undertaken. The areas are common in their richness of biodiversity and unique ecosystems that should qualify them to be declared as protected areas. However, due to uncontrolled anthropogenic activities, they have undergone changes and transitions that have affected their environmental integrity and well-being.

5.2 METHODOLOGY USED FOR DEVELOPING THE SCENARIOS

The scenario process in the three case studies has provided an insight into the uncertainties that may be affecting the environmental setting and human well-being. In this case, scenarios were used as tools that decision-makers can use to set strategies, measure and look for opportunities, as well as allowing the key stakeholders and affected groups of the areas to express their views, hopes and misgivings. Issues have been clarified through the analysis of each case study per se, in a timeframe of 25 years.

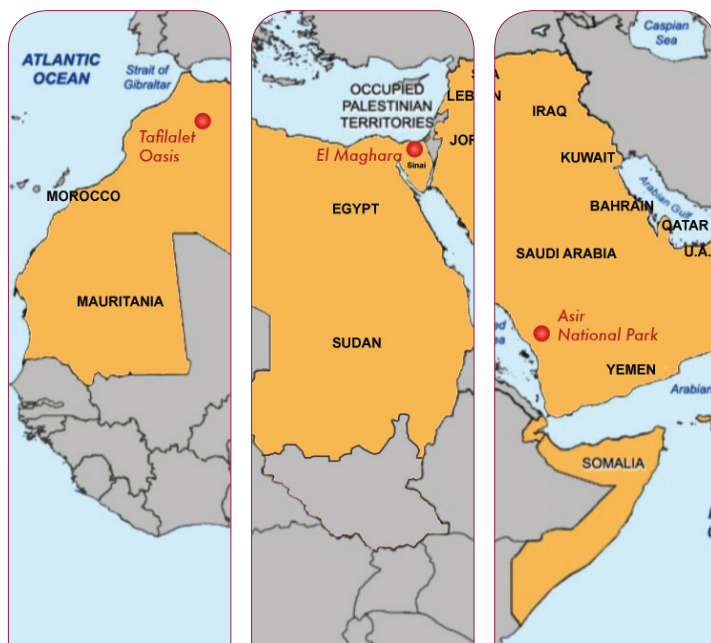


Figure 5.1 Locations of Assessments Sites

Source: Adapted from UNEP, 2010

5.2.1 Identification Of Key Drivers

The DPSIR analytical framework (see Table 5.1) has been applied for each case study based on scenarios depicted in each case study report. This was followed by a process of synthesizing the three case studies in order to establish the common issues and driving forces at the sites. This process was a key step in monitoring the possible relationship between issues, driving forces, pressures and impacts.

Through DPSIR analysis, the formulation of a scenario assumption matrix has been developed. This in turn has helped the evolution of the storyline for each scenario.

After narrating the storylines of each case study scenario, common issues, pressures and impacts have been gathered, marked and synthesized to give an overall vision on the situation of each scenario and the forces affecting it, giving possibilities and strategies in case of problem existence.

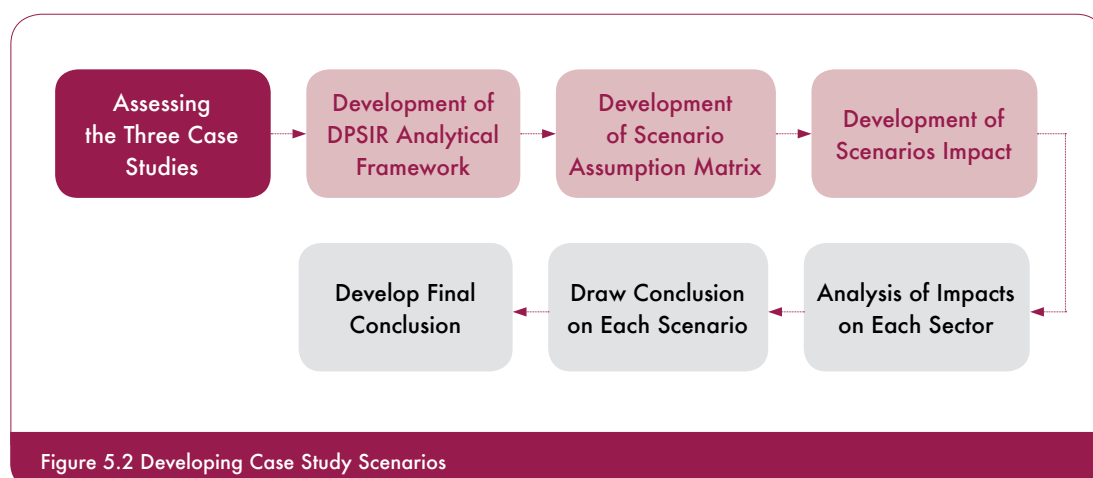
5.2.1.1 Key Driving Forces

1. Governance Efficiency

According to the UNDP definition, governance is: "The exercise of economic, political, and administrative authority to manage a country's affairs at all levels. It comprises mechanisms, processes, and institutions, through which citizens and groups articulate their interests, exercise their legal rights, meet their obligations, and mediate their differences".

According to the latter, poor governance is one of the main reasons behind the deterioration of environmental assets in any ecosystem. Poor governance has a negative impact on the social and economic situation of the study area and its inhabitants.

Government efforts to improve the quality of life for inhabitants in the study areas have been inefficient. Conflicts usually exist between inhabitants and existing set



of policies, as inhabitants usually accuse governance of allowing activities that destroy the environment and vulnerable natural resources, such as through quarrying, mining, massive land-use change and landscape fragmentation.

Inhabitants also blame governance for inadequate services and utilities that are far below their needs.

2. Economic Activities

The three assessments alike are endowed with considerable richness of natural resources that create real potential for development and investment. Following the trends of economic growth, intensive economic activities, in addition to social needs, might cause rapid urbanization and expansion of city patterns. The spread of such activities and the excessive extraction of

Table 5.1 Sample of DSPIR Method

Theme	Issues	Driving Forces	Pressure	State	Impact	Response
Human Activities	Extraction Activities Industrial Activities	<ul style="list-style-type: none"> • Poor Governance • Illiteracy • Mining and Quarrying activities • Unemployment • Uncontrolled human activities 	<ul style="list-style-type: none"> • Resource depletion • Land degradation • Excessive waste 	<ul style="list-style-type: none"> • Land change patterns • Solid waste random disposal (industrial waste) 	<ul style="list-style-type: none"> • Heavy pollution • Habitat fragmentation • Biodiversity losses • Pollution • Land encroachment • High pollution rates • Biodiversity loss • Water shortage 	
Social Services	Public Services Infrastructure	<ul style="list-style-type: none"> • Poor governance • Remoteness 	<ul style="list-style-type: none"> • Lack of sanitation • Lack of potable water services • Inaccessibility of schools 	<ul style="list-style-type: none"> • Poverty 	<ul style="list-style-type: none"> • Promoted illiteracy rate • Negative health impact • Water shortage 	
Water Availability	Water Scarcity	<ul style="list-style-type: none"> • Uncontrolled human activities • Nature of climate 	<ul style="list-style-type: none"> • Depletion of water resources 	<ul style="list-style-type: none"> • Lack of precipitation 	<ul style="list-style-type: none"> • Negative health impact 	

natural resources has exceeded regenerating rates and caused considerable damage to ecosystem integrity and the environmental setting. Major changes have taken place in the landscape and land topography.

3. Natural Resources

Environmental degradation is one of the core issues that mark the three assessments alike. It entails a number of attributes that include soil degradation, land-use change, water pollution, loss of biodiversity, and landscape fragmentation. Environmental degradation has a strong bearing on the quality of life of the inhabitants and contributes significantly to poverty, poor health and pollution problems.

a. Water resource

Water shortage is the main cause of the inferior quality of life in the area, with a profound effect on poverty, health, unemployment, and migration. Some of the study areas have witnessed a significant drop in rainfall in the last ten years. Much of the flashfloods that used to recharge groundwater is diverted to scattered pathways as a result of land-use change by gravel contractors constructing new roads and alleys to reach distinct rock sites. According to predicted climate change scenarios, it is expected that precipitation will be affected even further within the next few years, giving rise to a more complicated situation.

b. Land resource

The assessments show that land-use policies are not adequately enforced. The impact of loose land-use policies is strongly identified in

the assessment areas. The growing demand for building materials such as gravel, stones, and marble has turned parts of the areas into open fields for quarries and mines. Construction of new roads is one other major manifestation of land-use change with many drawbacks.

With such massive violation of land-use plans, the landscape has been fragmented and dissected, with serious effects on biodiversity and other environmental richness. Inhabitants put the blame for the loss of flashfloods that used to recharge their water storage units and irrigate their fields on these changes in the landscape.

4. Remoteness

The assessment areas are mostly located in isolated remote areas. Transportation services are limited, irregular, and unreliable for the inhabitants use, with no telecommunication services available. Due to the nature of the climate, sandstorms often cover the existing roads with sand, making travel between the areas of study and other areas risky. Analysis show that remoteness contributes to the current social and economic situation of the inhabitants of the study areas.

5. Services and Human Well-being

Availability of basic services varied from one area to another, based on the financial capabilities of the country. With the exception of Asir in Saudi Arabia, the assessments of El Maghara and Tafilalet had a substantially inferior set of services. The basic services offered and their level greatly impacts the



economic and social situation and the attitude of inhabitants toward the surrounding environment and natural resources. Most of the basic services that are missing in such areas consist of electricity, water supply, health services, transportation and telecommunication. The poor service in the assessment areas is a determining factor shaping many of the scenario findings.

6. Education

The level of education varies from one area of study to another. Location, transportation and services offered to serve education are some of the factors that influence the level of education enrollment in the area. Nevertheless, it was mostly noticed that there was a high rate of illiteracy in the three assessments, with different ratios between men and women. It was also noticed that the level of education and awareness among the inhabitants had very strong impacts on natural resources and how they managed the surrounding environment. In some of the areas it was noticed that due to the cultural and economic situation of the inhabitants, girls were not allowed to attend schools after a certain age. Illiteracy among women is a crucial contributing factor to the mismanagement of natural resources, as women are the ones that most deal with natural resources in their daily activities, as well as being the future mothers to new generations.

7. Employment








The remoteness, poor infrastructure and mobilization of natural resources and economic activities by investors in some of the study areas

have impeded efforts to promote economic development. Employment opportunities are hence very limited. The high rate of unemployment recorded in the assessment areas is a key factor that influences a number of attributes, such as poverty, migration, education and others. Moreover, unemployment, lack of proper services and isolation have forced many families and young people from the local inhabitants to migrate out of the areas looking for a better life and sources of income.

5.3 STORYLINE SCENARIOS

Moving Sand/Fox Scenario (Market Forces)

**Table 5.2 Moving Sand/Fox Scenario
(Market Forces) Scenario Assumption
Matrix**

Key Driving Forces	Moving Sand/Fox Scenario
Governance Efficiency	
Economic Activities	
Natural Resources	
Remoteness	
Services and Human Well-being	
Education	
Employment	

The moving sand scenario is characterized by poor governance dominated by market forces, in which the main target is economic development and profit, causing environmental deterioration, poor social situation and short-term economic benefits. Substantial increase in economic activities, pressure on natural resources and social situation exist with clear negative impacts.

1. Governance Efficiency

In this scenario, governance is mostly dominated by business oriented groups, with strong lobbying toward a market economy. They are strongly backed by multinational organizations that have peripheral ties with decision-makers in major entities. Representation of local community in governing bodies is low, with major predominance of investors and businessmen that have a strong presence in the business media coming from outside the area. On several occasions conflicts have erupted between local members of the governing bodies and those from outside the area, mainly the investors. Conflictive views, particularly regarding sustainability of resources and environmental integrity were flash points. While local members are more inclined toward resource sustainability, investors have a different list of priorities, with profit and business opportunities at the top.

The presence of poor governance and absence of law enforcement in the study areas, coupled with the lack of proper monitoring systems on economic activities, have led to negative impacts on the

ecosystem and human welfare. This has put pressure on natural stock and on the social situation, resulting in resource degradation, social crisis and conflicts.

2. Economic Activities

As a result of the economic vulnerability that exists in the region, people are very receptive to the kind of development that gleams immediate financial incomes. The areas have a high potential for economic development in terms of their richness in natural resources, unique traditions and culture which can attract local and international investors in industrial, agricultural and tourism sectors. Despite this richness, it is difficult to maintain sustainable achievement and competence in the local and international market, particularly with new emerging economic activities and technologies. These new ideas could only work on the patterns of profit collection without considering security standards, risk precautions and threats. However, it could lead to the improvement of the economic situation in the area.

Most of the newly established industries are based on using cheap labour and exploiting abundant natural resources of the area with no respect to sustainability. In this scenario, industrial practices are not based on sound sustainable and environmental codes. Serious environmental pollution problems emerge, causing considerable damage to the surrounding environment and ultimately leading to degradation of resources.



The growing industrial and economic activities in the area help create employment opportunities for the local people. Many labourers, mostly unskilled, find employment in the newly established facilities. On the other hand, skilled labour is mainly made up of workers brought in from outside the area from other parts of the country by investors, causing more pressure on the areas.

Two of the most market driven growing economic activities are tourism and agriculture. With regards to tourism, the number of services and support available to the tourism industry increases, creating high demand on land clearing for business development. With the booming tourism industry, sustainability is not always heeded. Pressure on land, water resources, and the natural environment and landscapes take place.

Tourism projects are established with the building of major infrastructures, which will raise capital and cause an increase in population growth and urbanization. This makes these projects unsustainable because the advantages that motivated their progress and development will eventually be eliminated by the tourism itself. For example, frequent shortage of fresh water, caused by the increasing number of tourists is one of the flash points between local people and the local council. Solid waste generated from tourists and tourism activities is also another flash point that causes a lot of tension between local inhabitants, local authorities and tourism industry representatives.

Water, landscape, lifestyle, local culture, traditions and indigenous knowledge, etc. are necessary ingredients for the subsistence of tourism in these areas. If these ingredients disappear the purpose of these projects will disappear as well. With no control and poor governance, the increasing number of visitors results in an increase in the pressure on local environment and hence to an increase in the rate of environmental degradation.

The growing demand for food, coupled with the long experience of local inhabitants and the suitability of environmental conditions, favor business opportunities in this field. Businessmen introduce new inefficient technologies to agricultural practices that fulfill the local, national and international market needs with an easy and quick profit, but in an uncontrolled manner which negatively affects the environment.

The use of cheap and inefficient technology causes deterioration in the quality of agricultural products and increases health risks. Heavy reliance on pesticides and fertilizers causes high levels of groundwater pollution and serious effects on wildlife in the area. Frequent incidents of dead animals are reported, presumably after being exposed to highly toxic pesticides. Use of polluted water for irrigation has negative impacts. Most poor areas use untreated wastewater as a main component of water source; as a result, problems of soil contamination appear.

Moreover, this transition from a traditional food production system to a commercial production system requires water and

agricultural inputs to be maintained. This will certainly generate an immediate income, but will not be sustainable in the long- term, as the use of inefficient new technologies in agriculture wastes a large amount of water as well. In some cases new efficient technologies can be a good method for water conservation as was the case in Tafilalet, Morocco, where the use of traditional irrigation methods was one of the driving forces of water scarcity.

There is an exploitation of agricultural lands through the intensification of cultivation and excessive pumping of water resources, which cause soil infertility due to the increase of salt content. It has also led to the shortage of water due to excessive exploitation and use of inefficient irrigation techniques (gravity system).

3. Natural Resources

In this scenario, interest in environmental sustainability is not high on the agenda of investors. Instead, use of natural resources is governed by commercial and marketing laws.

Extensive use of groundwater results in serious salinity problems, which affect water quality and quantity. Seawater intrusion is one of the major issues in some parts of these areas, with frequent complaints from growers using this water for their crops. Signs of desertification are quite conspicuous in various parts of the study areas.

Lack of a sound enforced land-use plan has led to severe fragmentation of the ecosystem, with many drawbacks on species abundance

in the area. Population densities of main endemic species dwindle, allowing a number of alien species to flourish. Industrial waste is not properly managed, with a large amount of hazardous waste infiltrating to groundwater causing alarming water pollution problems that are reflected on inhabitant health and well-being.

In this scenario, local inhabitants use natural resources to augment their nutritional needs, for domestic purposes and as medicinal material that inhabitants use as local medicine. The extensive damage to the environment and changes in land-use pattern that are caused by some industries change the floral construct of the area. A number of the local plants have nearly disappeared, while a number of alien species have flourished. The grazing industry is one of the most affected by invasive species, mostly unpalatable, and sometimes toxic. Many grazers are laid off, seeking jobs in the new facilities.

The impact inflicted on natural resources is heavily reverberated on the well-being of local inhabitants. Inhabitants tend to use ecosystem services and goods as integral components to fulfill their needs. Deterioration of these goods and services badly affects those inhabitants whose many needs are not attained.

In return, locals adapt an even harder stance toward the environment, as if they are trying to make up for the losses they encounter, and the damage to the existing natural resources becomes even greater.



Under the moving sand scenario, the demand for natural resources increases. As stated above, natural resources fulfill inhabitant needs as well as the demand for economic activities, which are most probably double the inhabitant consumption. This places natural resources in a vulnerable situation as they are also vulnerable to the climate. These natural resources are trapped by anthropogenic and natural forces.

Land and fresh water are considered the most vulnerable natural resources and are greatly affected by these activities. Expansion of economic activities raises the demand for land for new projects, food production and housing, which results in diverse negative impacts. Degradation and desertification are increasing through poor agricultural practices, overgrazing, uncontrolled land-use pattern conversions, and rapid population growth/urbanization as was the case in Asir National Park, Saudi Arabia. Economic activities have greatly accelerated urbanization, which has put pressure on forests and lands, resulting in the change of land-use patterns, and accelerated land encroachment. Land quality is deteriorating due to excessive extraction, as was the case in El Maghara, Egypt. The increase in demand of agricultural lands and products for market and domestic use influences the quality of soil as a result of intensified agricultural activities. Land is impacted naturally by events, such as droughts and flashfloods.

Water is influenced by the land-use changes created by economic activities. Construction of roads changes the underground water flow

patterns that were traditionally known by the local inhabitants due to pressure from heavy trucks. The increase in economic activities leads to over-pumping of underground water which causes water shortage. Contamination of water by disposal of waste on land and water bodies also occurs. Water scarcity becomes one of the factors that might limit development in the future. The competition over water from various sectors, especially the agricultural and industrial sectors will increase. However, it will have its direct influence on the amount of potable water used for domestic use.

Deterioration of environmental assets has resulted in serious environmental impacts, such as: landscape fragmentation; loss of habitats and floral and faunal biodiversity; soil compaction as a result of heavy truck movement; air pollution from dust and other particulate matter deposited on plants; contamination of groundwater with extracted materials; and loss of flashflooding. It also affects water resources due to unlawful exploitation in some of the industrial processes, including the cooling and washing of hardware. A number of cases are reported of the solid waste generated from industry being dumped into water bodies

Housing facilities for the employees of new industries are built with no consideration to land-use pattern and environmental setting.

4. Remoteness

In this scenario remoteness of the areas will decline. Roads and all communication methods are available to serve the new

emerging activities. Regular transportation services are established to link the area with major cities and centers in the vicinity.

5. Services and Human Well-being

Services are among the major sectors that thrive in this scenario. With the growing trends of investment and industrial development, a boost in some related services is evident. Investors have laid down some medical care units in the area to provide services for those affiliated to the several industries established in the area.

Moreover, local inhabitants have an open access to these units. A number of banks have opened in the area, mainly to serve industry and investors. On the other hand, some other services are not part of this improvement boost, particularly education as it does not resonate with the interests of business and businessmen.

Economic activities will introduce new activities and technologies to the areas, which will bring about an improvement in the economic situation. This will broaden the knowledge of inhabitants and will cause a shift in perception regarding newer technologies, particularly in the younger generation.

Basic services such as clean water, sanitation, healthcare, education and job opportunities will improve as they are essential to sustain economic activities and attract investors. Transportation will be available, but accordingly air pollution and higher energy consumption rates will occur.

Deterioration of environmental assets as a result of increasing extraction of natural resources causes municipal problems, such as solid waste random disposal and sewage surfacing.

6. Education

In addition to the fact that schools are not equipped to meet current advances, pupils also frequently have to travel long distances to get to school. Also, as part of traditions and norms, families do not allow females to become educated past primary level. This results in males vastly outnumbering females in schools. Under the moving sand scenario, education will generally improve and illiteracy will decline in some of the study areas.

For example, In the case of Asir National Park, Saudi Arabia, education is an opportunity for investment. With endowments of new technologies, young people growing up in the area will be more interested in further studies overseas or in local cities, rather than become involved in the agricultural or forestry industries like their parents.

In Tafilalet, Morocco, literacy will increase with the increase in income of local people and the initiative of human development funds. Unfortunately, this is not the case in El Maghara, Egypt, where government members are businessmen that concentrate on profit and market development. Education remains an inferior priority and schools are far from meeting the growing number of pupils who still have to travel a long distance to neighboring villages.



7. Employment

Under the moving sand scenario, unemployment situation will generally decline. Employment opportunities will be available. Migrants will come to the area in search of available job opportunities. Unemployment will not be a social and economic problem. Young people will not be interested in traditional jobs and crafts, and career goals will be directed more to market demands.

Despite the high rates of employment observed in the areas; labourers are denied many of their basic rights, including proper health insurance and pension schemes.

Conclusion








Widespread environmental degradation resulting from intensified economic activities have caused severe problems, including air and water pollution, bad sanitation, unsafe disposal of solid waste and poor lands creating poverty. This has resulted in large increase in diseases. Not only are human beings affected by the environmental degradation; livestock, fish, and the whole ecosystem will be in danger as well. In contrast the spread of economic activities had increased the changes of job opportunities with a slight improvement in some social services and a decline the areas' remoteness.

Desert Tortoise (Policy Reform Scenario)

Under the desert tortoise scenario poverty and illiteracy continue to be a problem. It is expected under this scenario that application

and enforcement of laws will have a slow, gradual and positive impact on the economic, social and environmental situation. Limited interventions are implemented by the governance through public awareness campaigns and education initiatives without any strong policies in place to protect ecosystem services. Nevertheless, the negative impacts will slowly decline.

**Table 5.3 Desert Tortoise
(Policy Reform Scenario) Scenario
Assumption Matrix**

Key Driving Forces	Desert Tortoise Scenario
Governance Efficiency	
Economic Activities	
Natural Resources	
Remoteness	
Services and Human Well-being	
Education	
Employment	

1. Governance Efficiency

In this scenario a large and strong representation of local inhabitants in governing bodies is unprecedented. The strong influence of local inhabitants in the

local council has significant impact on the decision making process, particularly in issues related to maintaining sustainability and environmental codes.

Governing bodies place special emphasis on local knowledge and its role in running daily life. A special committee for environmental sustainability is set by the local council to keep an eye on relevant issues including land-use patterns and natural stocks.

The council establishes some working connections with a number of national and international bodies in the field of environmental sustainability, inviting some of the head figures to visit the area seeking their guidance and support. Under the auspices of major NGOs, the local council launches a successful nationwide campaign to salvage the environment of the area, asking donors for contributions and support.

Governance is giving an outstanding example of how to go forward, with efforts to help local inhabitants attain a reasonable standard of living, strengthening environmental sustainability ethics and practices. Public awareness and resulting pressures from locals is at a sufficiently significant level that forces the government to take notice, develop capacity building and training programmes around sustainable management. Governance is playing an effective role in ensuring the participation of all sectors of the community based on equity and sharing responsibilities to encourage inhabitants to play their participatory role at area level.

2. Economic Activities

Industry is taken up by the private sector in a sustainable manner. Foreign investors are encouraged to take part to provide the necessary cash, expertise, and access to the global market for the growing industry. Governorates have taken initial steps to set and enforce the implementation of environmental laws, as a part of its reformation strategies. Industrial pollution does not come under full control – some people still manage to get away with “dirty” industries. It will take a while for people to understand that protecting the environment is not for the sake of their governorates, but for their own and future generation’s sake. The local council has allocated an area as an industrial park, in which all industrial facilities are situated. The park, located on the outskirts of the area is divided into different zones, each for a particular type of industry, with strict regulations regarding emissions, waste and their management.

The governmental initiative has made a change in the attitude of industry toward the environment, and has helped them adopt sustainable production programmes, protection of biodiversity and maintained ecosystem integrity. For example, sustainable ecotourism and medicinal plants industry have been enhanced as a main source of income.

The Arab region started focusing on presenting its distinct tourist attractions in such areas. Strong regulations are applied to ensure that local travel agents provide



the best service to the tourists, good roads, and more business opportunities, taking advantage of the increasing number of visitors and holidaymakers. Nevertheless, inconsiderable acceleration in tourism increases the degradation of natural resources.

3. Natural Resources

In this scenario natural stocks are considered one of the major priorities of the governing body, who spare no efforts to maintain their sustainability and integrity. A set of laws and regulations introduced and enforced by the governing body pose a potential leverage to restore the quality of natural stocks in the study area. In order to face water scarcity and seawater intrusion, the governing body introduces a water metering system to limit irrational use of groundwater. A special quota for inhabitants is allowed based on their family size and land tenure. Governorates in the Arab region are taking initial steps towards improving water storage facilities, supervised by medical staff to ensure a reasonable quality of drinking water. Governance is making good use of the cooperation of the private sector in sponsoring the installation of some water desalination units attached to major water sources to be distributed equally to inhabitants.

Groundwater abstraction is controlled and water re-use is abandoned and is replaced with water recycling. Water use rationalization will gradually increase with the increase of law implementation and governance monitoring.

Plans are prepared for the rehabilitation of the agricultural system, which is the main water user. The water use efficiency in the agricultural sector is closely monitored. As a result, less agricultural drainage water is generated, reducing pollution to water bodies.

The council takes the initiative of building a number of small dams and water storage facilities to help harvest flashfloods. In addition, a number of specially designed structures are built as intercepting bodies to slow down flashfloods, allowing water to percolate and feed aquifers. Much of the information related to the location of dams, water storage facilities and intercepting structures is based on the views and knowledge of local inhabitants. Equally important are council efforts to prevent water pollution. In this respect, industries working in the area are selected on the basis of their environmental impacts. Industries are encouraged to adopt a cleaner production scheme to minimize their environmental impacts. Industries abiding by such sustainable codes are granted special privileges. Overgrazing is one of the practices discussed in the local council meeting and it was agreed to limit the number of herds according to the suggestions and views of local chiefs. Similarly, extractive industries are limited to licensed areas that do not have violations of land-use pattern.

Sustainable land-use patterns which bring several advantages locally are observed, including good harvesting of flashfloods and

the elimination of pollution sources, as well as sustainable use of extractive materials. Such sustainable exploitation is bound to maximize the area's reserves, adding more potential and longer exploitation. On the other hand, tourism is on the rise, bringing in more people, but with decreasing support for maintenance and management. A population increase per year results in an increase in the number of visitors and job seekers. Thus, conservatory land degradation should occur in proportion to the number of visitors to it. While no direct intervention occurs, local inhabitants tend to police themselves and visitors as well, so that negative impacts are reduced.

The governing council, with the help of some international bodies, converts large areas into protected areas. Special arrangements are made to keep a herbarium that represents major dryland floral species. The protected area and its attached herbarium have proven to be an attraction that hundreds of university students and specialists visit regularly. The protected area and the revenues generated are a major source of income that is reflected in the improvement of the infrastructure and services of the area.

Under the desert tortoise scenario, restriction and conservation of the use of natural resources has gained positive impacts. For example, Egypt's restrictions on land-use, enforced by city council is an important factor that maintains pattern, helping the Bedouin collect flashfloods to make good use of them for agricultural and domestic use.

4. Remoteness

Remoteness has declined with the improvement of transportation due to the presence of the industrial sector. On the other hand this causes an increase in air pollution levels, increase in energy and fuel consumption rates and changes land patterns, which has a direct connection with the change of underground water patterns.

Under the umbrella of sustainable industry, transportation is improved and job opportunities are created. However, it does have some negative impacts that should be considered during the industrial plans. Transportation is improving, with the increase of economic activities and tourism, which have allowed the areas to have connections between neighbours, eliminating the feeling of marginalization.

5. Services and Human Well-being

In this scenario, public services and human well-being are at the top of the governance agenda. However, with the notably limited public funds set for services, the council has favored a self reliance scheme to help improve services and the quality of life.

An agreement with industries operating in the area is made, whereby industries open their medical centres to receive local inhabitants, providing them with needed medical care free of charge. Industries also contribute in providing schools with basic materials needed for sound education, as well as providing some pupils with jobs during summer holidays.



Industries operating in the area assign some seats on their buses to serve the community traveling to nearby cities where buses travel to bring workers. This service allows local inhabitants to travel to major cities in the area, and helps the locals connect with a wider community.

As a result of the awareness campaign run by governance, the local population and those involved in preservation begin to raise awareness about degraded resources and start campaigning about natural resource erosion and natural products. Inhabitants that are affected by the deterioration start to become aware of the decline in their practices; this encourages local leaders to negotiate with the government to reinforce effective policies.

6. Education

Education plays an important role in this scenario. Education has improved through the initiation of a number of temporary schools and healthcare units that are constructed using local pre-fabricated materials until permanent buildings can be built. Inhabitants that were reluctant to send their young boys or girls to far-off schools now feel comfortable sending them to nearby schools.

The increased number of schools and pupils has raised public awareness to a great extent. Schools are used in the afternoons, after school hours, as illiteracy eradication centres, and introduce relevant subjects, such as environmental awareness, and health and

safety issues. Literacy rates are expected to double, reaching a level almost similar to that achieved in the best case scenario.

The tourism industry is given special emphasis as one of the most successful fund generating industries. A one day trip programme known as Know the Desert of Your Country is marketed in the schools and universities of Egypt. Students from various parts of Egypt can come to the area for a one day visit and are introduced to the desert environment. Students can spend the day watching desert birds, visiting oases, and studying vegetative covers and wild plants.

7. Employment

The governing council starts some vocational training of local inhabitants qualifying them as rangers guiding tourists visiting the area. Small loans are provided through a special scheme to small businesses and are used by a number of young inhabitants to start small business based on local products such as medicinal plants and olive oil, as well as other small industries. The scheme opens up ample venues for employment, particularly for young women who are employed for the manufacture of home based products such as scarves and other local handcrafts. The local council has reached an agreement with industrial facilities, whereby each facility would employ a ratio of its labourers from local inhabitants. Local employees are provided with technical training and capacity building that matches the type of industry. This scheme has worked out nicely with

direct influence on employment records and community income. In addition, industries are encouraged to have venues for their products in the area, sold at special prices.

In terms of employment, the prosperity of the economy generates more employment prospects, reduces unemployment or at least keeps it from increasing. The amount of poverty will slowly and gradually decline, but will not be completely eliminated yet, and internal conflicts and instabilities calm down as living standards improve.

Conclusion








Generally, the situation will improve in some social aspects and will deteriorate in others, and this will be a result of anthropogenic activities that are in the process of being improved. Air quality has deteriorated in the areas as a result of transportation and industrial emissions. A slight improvement in access to safe drinking water and sanitation, the improvement of the economic situation and higher average family income will give a chance for more people to afford to buy medication. There is an overall improvement in the health conditions of people.

In contrast, the existing percentage of poverty will have an adverse impact on natural resources and may also lead to social problems. One of the forces that cause the persistence of poverty is population growth, which has an impact on water consumption that affects the availability of water for agriculture. This forces inhabitants to augment available water resources by overuse of groundwater. A series of problems

due to groundwater overuse are observed, such as salinity, invasive species and others. Environmental awareness on the part of the inhabitants puts pressure on governance to intervene and enforce policies to solve these issues.

Dunes/Scorpion Scenario (Fortress World Scenario)

**Table 5.4 Dunes/Scorpion Scenario
(Fortress World Scenario)
Scenario Assumption Matrix**

Key Driving Forces	Dunes/Scorpion Scenario
Governance Efficiency	
Economic Activities	
Natural Resources	
Remoteness	
Services and Human Well-being	
Education	
Employment	

Under the dunes scenario there are fears that the presence of inefficient governance, weak implementation, absent public participation and natural resource mobilization by investors, will lead to economic, environmental and

social problems, increasing the vulnerability of the poor. In this scenario the investors do not have a clear presence in governance, but they take full control of the political, institutional, and legal systems by paying bribes and through strong connections with authoritarians and governing bodies. This affects the inhabitants by depriving them of any rights in using their natural resources and generating profits for survival. The main focus is not on achieving sustainable economic development but on making large personal profits by tapping into natural resources for the investors own benefits without considering sustainability.

1. Governance Efficiency

Laws related to natural resource management and environmental protection are not fully implemented, resulting in overexploitation of natural resources and biodiversity losses, to the benefit of investors' own businesses and profit. The strong, mutual relationship between authoritarians and investors will leave no room for any plans for maintenance, follow-up and resource conservation to be implemented. Governance officials lose their accountability as corruption spreads among them.

The authoritarians live in protected enclaves with the investors and take full control of resources. They deprive the impoverished majority of the benefits of their own natural resources, and leave them with very few options, as well as with a sense of disappointment and isolation. This has its impact on the social and economic situation

of these areas, which will increase the level of poverty and illiteracy of the inhabitants keeping them from knowing their rights.

2. Economic Activities

The investors, which are a minority, take a much larger share of the profit than the poor majority. Most of these businesses are run as monopolies for an individual's own benefits. This affects the areas and the countries' economic position, as well as incoming revenues on the national and international levels as there is no true competition in the local or global markets.

Investors do not necessarily live in the same areas as their industries, so they do not develop a sense of belonging to these areas in order to offer clean industries. People in poor areas fight for any work opportunity, irrespective of the associated risks to their health and the environment. This not only takes place at the national level, where polluting industries are moved from one area of a country to another, but also occurs across the region, as many Arab countries welcome harmful industries from foreign countries, without considering the health risks to citizens.

Industrial demands take higher priorities over agricultural and communal demands, despite the fact that agriculture consumes more water than industry. As a result, the stress on agriculture to produce more food from lower-quality land and less water, affects the quality of food and its security. It is observed that with the increase of industrial

activities the population also increases, which increases the demand for food production, land and water.

Moreover, it affects the opportunity to get food products into the national and international markets as a result of remoteness and low quality, which makes local products less competitive. For example, in Tafilalet, Morocco, the quality and quantity of produced dates decline due to 'Bayoud' disease ravaging the best varieties of dates. This puts food security and the economic situation in jeopardy.

With the introduction of western culture and ideas to the areas, and with the presence of greedy governance that does not preserve historical places and attractions, the poor realize that there is not a chance to live on subsidiary tourism-related activities. Their hopes vaporize as tourist attractions rapidly deteriorate causing a large decrease in the numbers of tourists visiting. Increased security risks, internal conflicts and instabilities also aggravate the problem.

3. Natural Resources

The lack of good governance and regulatory body follow-up and control, has allowed the expansion of activities even in the most ecologically sensitive areas. Conservation areas have been badly affected, with many trees uprooted and cut to be used for fuel. This has caused the deterioration of environmental stocks, resulting in economic and human welfare problems, such as loss of flashfloods and plant cover,

abandoned agriculture, fragmentation, loss of biodiversity, land degradation and species disappearance.

Accordingly, land resources deteriorate very rapidly, particularly agricultural land due to the over-use of fertilizers, pesticides and the lack of care and interest. Moreover, rangelands suffer from overgrazing which results in loss of plant biodiversity and promotes the phenomenon of desertification and sand encroachment due to the loss of the vegetation cover.

Water resources have also been negatively affected by overexploitation. The excessive pumping of groundwater has caused blight of palm groves, which has impacted the production of palms as one of the most popular agricultural products of the Arab region. Overharvesting of groundwater is turning the groundwater saline, and is increasing seawater intrusion, causing soil degradation and introduction of some invasive species that live in saline groundwater. In addition, some rare plant species may disappear as a result of severe drought and overuse. Loss of plant cover will cause a major loss of grazing activities and products which help to improve the local economic condition.

4. Remoteness

Remoteness of the areas will slightly decline. The industrial activities owners constructed roads serving their factories with specific road patterns without considering the inhabitants needs for traveling to other cities.



5. Services and Human Well-being

Public health, basic services, human and infrastructure development are among fundamental issues neglected by the investor-controlled governments. Monopolies and privatization systems have made the price of services too high for the poor, who are therefore deprived of basic services and results in an increase in the migration rate of the locals. With regards to health, malnutrition, poor hygiene, water-borne diseases, lack of drinking water, poor sanitation and basic hygiene have deteriorated health conditions. Considering the inadequate hospital facilities and the lack of preparedness to meet such emergencies, a high possibility of communicable disease outbreak and child mortality increase seems possible. Moreover, air pollution caused by massive industrial activities in the areas is resulting in widespread pulmonary disease among the local people.

Farmers cannot afford to adopt modern technologies due to poor economic conditions. Crop production from marginal lands with low-quality water increases the production of crops that are unsafe for human consumption. The problem shows its effects as deterioration in public health and reduction in exportation of agricultural commodities.

The population growth has resulted in unorganized urbanization leading to very large numbers of people living in unhealthy accommodations without a safe water supply, sanitation, or the rest of the basic services.

The deterioration of services has strong repercussions on social aspects, culture, security, and gender issues. Women have the heavy burden of managing the family's affairs under much hardship. Fetching water, plants for food, fuelwood, as well as managing grazing activities are more difficult under the circumstances.

As a result of this intolerable situation, migration of many of the inhabitants of such areas to other regions or abroad is observed. This migration contributes to the abandonment of traditional practices which results in the loss of local know-how, through lack of young people succession.

The gap between the rich and the poor widens, creating more social tension. There is an increase in the loss of cultural identity as investors increase exposure to the West and change consumption to that of a western-style culture, while the poor stick to their traditional cultures.

The lack of basic services, in addition to poor governance, has contributed to breaking social harmony and communications at the tribal level. It has also influenced relationships among tribes and between the whole tribal community and local authorities. The relationship among individuals in each tribe is strained because of the dominant hardship and harsh competition for food, water, and other resources. Unrest between tribes develops to a pan-community unrest in which tribes confront governance represented by police. This will drag the area to bleak uncertainty, with possible eruption of violence.

6. Education

The deterioration of education is increasing. Due to the small number of schools and socio-economic conditions in the areas, inhabitants stop sending their children to far-off schools, and do not allow girls to continue schooling beyond the primary level. Not allowing girls to go to school after a certain age increases the level of illiteracy within the society. Illiterate mothers fail to provide an enlightened and healthy childhood to their children. Illiteracy, as well as the number of school leavers, is increasing. Under this scenario, a growing and alarming level of illiteracy in such areas stifles all efforts to improve the quality of life and to enhance people's economic profile.

7. Employment

Investors misuse the poor as cheap labour while making large profits at the expense of deterioration of the environment and resources. Apart from those who work for the elite, the rest of the poor public live below the poverty line in increased marginalization. Professionals outside the investors closed circle can hardly find appropriate jobs.

The poor try to create job opportunities legally or illegally; they subsist on poor agricultural practices, grazing and local trading among themselves. In some cases inhabitants may even resort to growing and trafficking narcotic plants due to growing feelings of hardship and discontent. Narcotic plants bring some extra money to the area, much of which is used to buy arms for use against the police force, pushing the area to the verge of open conflict.

The spread of illegal activities on the part of some encourages drug dealers from other parts of the country, which adds more uncertainty and challenge to the area. The repercussions of poverty in all its dimensions are significant. Another example of illegal opportunities is present in Morocco.

A begging phenomenon is developing among children, which reduces the quality of tourist attractions in the region. While in Egypt the majority has succumbed to their destined fate, with their grudges and pains. However, a minority group of young Bedouin have developed a religion-based cult that allows the use of violence to address the poverty and injustice they feel.

Conclusion








In general, living conditions are precarious, but are more serious for women who are charged with the burden of production and reproduction works. The illiteracy rate in females is higher than that in males, which makes the situation for females more precarious with negative impacts on living standards, health and social life. The situation is not sustainable as the poor majority seeks to show their rejection of it. Internal conflicts spread.

The different cultures and traditions prevailing in the areas in comparison to those in all other parts of these countries have deepened the feeling of alienation and allowed a barrier between the officials and the locals, making communication difficult. Poverty is increasing in a context of non-application of laws and regulations.



Gazelle Scenario (Great Transitions Scenario)

**Table 5.5 Gazelle Scenario
(Great Transitions Scenario) Scenario
Assumption Matrix**

Key Driving Forces	Gazelle Scenario
Governance Efficiency	
Economic Activities	
Natural Resources	
Remoteness	
Services and Human Well-being	
Education	
Employment	

This scenario is an illustration of how big hopes may come true. Inhabitants, governance, environmentalists, and industrialists all have the same positive influence on critical issues, such as land degradation, water scarcity, poverty, bad services, and others. There is an economic paradigm shift from that of economic growth to the one of economic development that considers other economic sectors besides the industrial sector, such as the agricultural and tourism sectors.

1. Governance Efficiency

Equity is defined as having the same opportunities in life. To achieve this goal there is a need to have efficient governance and good services. All actors work in stimulating economic growth while maintaining environmental sustainability.

In this scenario most of the marginalized areas in the Arab region gain their welfare and rights through their representatives and governance. A newly formed government that puts special emphasis on marginalized communities with representatives of inhabitants in parliament proves its success. The government puts effort into providing good services to the area. The local council is reformulated, with new members representing all stakeholders. The council adopts policies and strategies to improve infrastructure and secure the needs of newly emerging companies and activities. Institutional reforms take place to support the newly evolving governance. Corruption of officials and employees is no longer a phenomenon. The governance operates in a transparent way. Many pieces of information that were otherwise inaccessible are made available to the public.

2. Economic Activities

The core of progress synergy is having all stakeholders striving to separate economic growth from environmental degradation, with a focus on environmental integrity through transparent policies, and switching the economic growth paradigm to one of economic development. Industry representatives donate money to start the service upgrading scheme.

Improvement of services includes the provision of clean water, electricity, schools, and communications facilities such as telephones and transportation.

Governance makes use of all aspects to diversify and boost economies, and industrialization is at the core of economic development. The presence of favourable conditions in the areas, such as skilled labour, natural resources, internal stability, consistent and transparent governments, and strategic geographic locations help to attract investors to the areas. Tourism and agriculture that were previously neglected are given a role in the economic development stage, using all their help and native knowledge.

The assessment areas have great assets for the progress of touristic activities, such as their architecture, cultures, traditions, native rituals and virgin appearances. These areas are still not affected by the technology and globalization that are highly noticed in cities. This creates a great chance for promoting eco-tourism.

Plans and strategies are formulated to ensure the conservation and development of tourism. Restoration of deteriorated and damaged historical sites is carried out with aid from specialized international organizations. Careful utilization plans are drawn up in order to ensure that these historical sites are not affected by tourist activities.

Considering tourism as an income source for the inhabitants by using the local workforce gives the locals a sense of belonging to the

tourist activities and creates job opportunities. This helps in the conservation of historical places. Governance also creates strict laws and penalties against any individual who causes any destruction of these premises and protected areas.

The transition also changes perceptions regarding agriculture as being just a source of food into a profession that needs to be developed and enforced in the economic plans for these areas, particularly that these areas are specialized in special kinds of crops and agricultural products, such as palms (which are common in the three study areas), and medicinal herbs, such as in Morocco. The government works on promoting agricultural and irrigation practices. This takes place through the study of local know-how and traditional practices, making the best out of it by developing any drawbacks with the use of up-to-date efficient and effective technology. Referencing to local know-how and traditional practices gives the local inhabitants a sense of belonging to the introduced techniques and a reason for the change.

The traditional role agriculture plays changes, as farmers change from growing subsistence crops to growing cash crops. Agriculture extension is strengthened and takes a leading role in farmers adopting modern irrigation techniques, replacing chemical fertilizers and pesticides with biological types, growing new crop varieties which are more tolerant to climatic changes and pests, and economizing irrigation water use. Drainage water re-use is abandoned



for water recycling. Strong laws governing the safe use of groundwater in irrigation are introduced and enforced.

Public and private partnerships take place in this economic sector as crops grow and factories are built to accommodate and filter crops to be packed and introduced to the national market. There are future plans to introduce these crops to the international market as well. Job opportunities are created for the local inhabitants and future generations to come.

3. Natural Resources

There is exceptional attention on the environment by the governorate and inhabitants. Land and water are given the highest priorities as being the most threatened resources. Unsustainable use of these resources is gradually replaced with sustainable management procedures.

In light of this scenario, it is expected that the areas will be short of some resources. The most vital of these resources is water, the main source of life. Being aware of this reality, the areas are taking sufficient measures to ease the problem.

Integrated water resources management is the primary solution adopted. It is implemented within the necessary legislative and institutional frameworks. Mistakes are learnt from faster, leading to more efficient implementation.

Improving the quality of water bodies is systematically translated into similar improvements. The water quality of lakes and

coastal areas noticeably improves leading to healthier biodiversity; in some cases, by treating water bodies through filtering systems for the removal of many waterborne pollutants. With the help of academicians, simple and cost-effective treatment facilities are devised and approved. The whole ecosystem shows symptoms of recovery after long deterioration.

Despite increased industrial activities, industrial waste is not allowed to be disposed in water bodies. The same precautions are applied to agricultural drainage, which is reduced in quantity and improves in quality as agricultural practices improve. Waste management procedures are introduced for dealing with household and other solid waste. Sewage water is properly treated before being disposed of or used for agricultural use.

Awareness campaigns play an important role in the current scenario situation, arranged by specialists to explain how to use water without being exposed to the high risks of contracting waterborne diseases.

Legislation and laws are designed to improve land-use and tenure situations. Strict implementation of laws takes place regarding land-use for agriculture or building purposes, to ensure food security and public accommodation. The use of land for agricultural purposes is classified according to the kinds of crops and season, in order to improve the quality and fertility of soil and the quality of products. Land tenure laws are improved and changed from the traditional

inheritance customary laws that were well known between tribes, into governmental registered lands. This gives inhabitants legal rights to land tenure and avoids land ownership disputes.

Buildings for any purpose are not permitted except in the designated areas. An urban planning scheme for the areas has been made by urban planners and engineers to divide areas according to land-use, taking into consideration different aspects of risk prevention according to sustainable development criteria.

4. Remoteness

There was a significant decline in the remoteness of the areas. The Governance along with the private sector had worked to upgrade the and improve the roads networks, transportation methods and methods of communication. These improvement plans had given the areas further economical opportunities and an upgrade to the inhabitants welfare.

5. Services and Human Well-being

Development plans for services had taken place to improve the quality of life for the inhabitants and to promote investment opportunities in the areas. Improved water supplies, sanitation, and air quality show direct impacts on public health. Houses have access to clean tap water for the first time. Sewage water is collected and treated through a biological system which makes it re-useable. The impact of utility service improvement on health and welfare is significant, and is easily

reflected in the decreasing number of child deaths and good control over the spread of communicable diseases. Awareness raising campaigns for personal hygiene are held by governance and multinational organizations. These campaigns play an important role in preventing health risks especially with the high rates of illiteracy among females at different age levels.

6. Education

There is an active action from the educational public sector to improve the quality of education given to children and eradication of illiteracy in older inhabitants. Governance works on easy access to schools, as new schools are built, with major contributions and funding from government bodies and the private sector. The flourishing economy has allowed more people to educate their children. Good education and knowledge pay off in making people much more aware of their local environment. A higher technology institute has also been founded that provides training to local students in fields of interest that would benefit the area, such as tourism. The literacy rate has improved noticeably, with more girl pupils enrolled in schools. Financial incentives are provided to families allowing their girls to continue their education at the secondary-school level. The literacy rate is expected to double, reaching more than 50 per cent, as the number of schools increase and proper control on education is enforced. One of the most important impacts of improved education is in the demographics where population growth rates see significant reductions. On



the other hand, despite lower population growth rates, population sizes still remain a problem in some countries as health care improves and life expectancy increases. However, careful planning and adjustments to population structures gradually converts these large numbers of people from being a burden on society to being a useful work force.

7. Employment

The improvement of this long-neglected basic Infrastructure has made the areas become more favourable to businesses and industries. The improvement of transportation, roads and methods of communication encourages many investors to start businesses with affordable wages and creating job opportunities for the inhabitants. Inhabitants are put through training and awareness campaigns in industrial safety procedures, which promote knowledge in the workforce. Migration to better areas in search of work opportunities and better life is greatly reduced or even reversed with many people preferring to go back to their home lands.

Conclusion

Economic development cannot be achieved without internal stability and good governance. As education and public awareness improve under the great transitions scenario, people become conscious of their human rights and indeed fight for them. Step by step, bureaucracy loses ground to a true democracy in which people can decide for themselves.

However, good bureaucracy is sometimes a fundamental requisite for people's welfare, and is strongly felt in a number of spheres such as in good teaching, sound extension services, health and vaccination programmes, and many others. Follow-up programmes and regular visits of key officials to the area ensure the adequate efficient and proficient performance of civil servants and government employees.

CONCLUSION

Ecosystem deterioration in the case study areas is an outcome of a set of key drivers including governance efficiency, economic activities, and management of natural resources, accessibility, and available services. Revealing the negative impacts of human induced activities and redirecting them into sustainable development paths requires knowledge of consequences of various policy actions. The latter could be achieved through analysis of potential impacts of future actions to understand the complex ecological –social –economic process that represent the main pillars of sustainable development.

The presented scenarios explored the diverse development paths that might environmentally, socially and economically impact the case study areas. Four scenarios were developed using narrative storylines and quantitative data to explore different policy approaches and their impact on the economical, social and environmental situation of the three case studies. Each scenario presented interlinkages with

numerous environmental issues; to link environment with development issues, such as water scarcity, land use change and degradation, and biodiversity loss. The chapter highlighted the need to link environment with development issues, such as extreme poverty, remoteness and human vulnerability and wellbeing.

Assessment of the Driving forces in each storyline had shown that in all scenarios the presence of economic activities will rise, increasing job opportunities, decreasing poverty and remoteness of the areas. This potential success varies according to the Governance efficiency in laws implementation and capabilities to solve issues. Analysis showed that scenarios which ruled by inefficient governance had shown a further degradation in the natural resources especially water, land and biodiversity with the presence of economical activities. Analysis of the case studies using the four hypothetical scenarios revealed that social sustainability and human welfare only exist in scenarios with high governance efficiency and considerate investments.

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