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Syrian Coastal Region

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SUMMARY OF THE ACTIVITIES CARRIED OUT AS PART OF THE COASTAL AREA MANAGEMENT PROGRAMME (CAMP) OF THE SYRIAN COASTAL REGION

(1991 - 1994)

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1. BACKGROUND INFORMATION ON THE SYRIAN COASTAL REGION

On a global scale, the development of the Syrian coastal region has been to a large extent a response to the basic national needs. In that, the available natural resources (favourable geographic position, mild climate, available water and land, etc.) have been the major determinants of the economic profile of the region. The existence of these resources has enabled the construction of large transportation and industry infrastructure (modern harbours, railroads, highways, oil refinery, terminals and pipelines, cement factory). However, meeting the basic national needs has not been followed by the development of spin-off industries. A somewhat belated regard for agriculture and tourism as major resources was indeed a problem which, paradoxically, has proved to be an asset opening up vast possibilities for the future economic development of the region.

A considerable success achieved in the domain of social development (health, sanitary and educational upgrading) boosted up the population growth so that in the last two decades the coastal population nearly doubled.

The notable development of basic economic activities and infrastructure in the coastal region affected its physical environment having the usual after effects, such as population pressures on the narrow coastal ribbon and major cities. Concentration of economic activities and population in some parts of the region pushed the physically limited and ecologically fragile resources close to the edge of degradation (pollution of fresh water resources, sea and beaches; degradation of soil, etc.). Considerable concentrations of pollution can be seen within the perimeter of two largest coastal cities -Lattakia and Tartous. The environmental degradation is the least felt in the northern part of the region which is less densely populated.

Having in mind three main geographical parts of the region - the coastal plains, the hilly area, and the mountains, the major sources of degradation and environmental conflicts in the region are rooted in the concentration of activities and population in the region's narrow coastal plains. These are:

- fresh water pollution and sea water intrusion in the ground water due to overpumping;
- sea water pollution caused mainly by liquid waste discharges from big coastal cities;
- damaging of landscape by quarrying (extraction of sand and pebbles), solid waste dumping and illegal housing;
- encroachment of agricultural land, sites allocated to urban and tourism development and areas of special natural value by haphazard or illegal housing;
- indiscriminate concentration of versatile activities in the narrow coastal strip.

Some major findings and assumptions of the Preliminary Study, which may indicate the course of the future development of the region, are the following:

- All basic regional resources (agricultural land, economic activities, infrastructure facilities, large urban settlements, natural, landscape and cultural values) are located in a relatively narrow coastal zone;
- The existing alternative strategies of development and population distribution indicate that migrations are likely to continue to flow towards the urban and rural areas of the coastal zone;
- The bulk of the future economic development expected in agriculture, manufacturing and tourism (which mostly draws on the existing infrastructure facilities) will also be concentrated in the coastal zone of the region.

Compared with the rest of the region, and judging by the existing state of the environment, natural resources of the coastal zone are the most endangered ones (sea water, fresh water, beaches and areas of natural value).

To avoid that the existing conflicts between the vital development activities and the environment of the coastal region persist in the future, a comprehensive planning has to be developed and immediate actions undertaken to be the basis for a careful management of coastal resources.

2. BACKGROUND OF THE PROGRAMME

Since 1989 the Mediterranean Action Plan has been gradually orienting its activities towards the environmentally sound integrated planning and management of the resources of the Mediterranean coastal areas.

Understanding that the protection and enhancement of coastal areas and their ecosystems can be achieved through a rational development which uses integrated planning as its major tool, within the Priority Action Programme (PAP), a special emphasis was placed on its priority action "Integrated Planning and Management of the Mediterranean Coastal Areas".

In order to verify in practice the knowledge and experience gained in all priority actions, and based on the principle of integrated planning and management of resources, PAP started in 1988 the implementation of 4 country pilot projects as a new form of advanced collaboration of PAP and other MAP programmes with national and local institutions and experts aimed at creating conditions for introducing or developing the process of integrated planning and management of coastal resources. In the 1988-1989 biennium, in the majority of projects, preparatory activities were completed (a considerable knowledge was gathered on the state and problems of ecosystems in the pilot areas), as well as the first phase of the programmes.

The Sixth Ordinary Meeting of the Contracting Parties decided that those activities be continued and that all MAP components be included evenly. That required certain changes in the methodological and organizational approach to the implementation of these activities, as well as the change of the name of pilot projects into "Coastal Area Management Programme" (CAMP).

The Government of Syrian Arab Republic promptly expressed its commitment to the philosophy of the integrated planning and management of coastal areas and selected the coastal region of Syria at the Fifth Ordinary Meeting of the Contracting Parties (1987), as one of the first Coastal Area Management Programme. Preliminary activities started in 1988.

In the biennium 1988-1989, the bulk of MAP activities in Syria was related to the preparation of the "Preliminary Study of the Integrated Plan for the Syrian Coastal Region", and to the continuation of the monitoring of the pollution of the coastal sea, ongoing since 1986.

The work on the Study started in 1988 and it was carried out jointly by a team of Syrian and PAP experts recruited from the Mediterranean region. The actual work on the Study was preceded by preparatory activities, the most important being the organization of a training course for Syrian experts which was dedicated to the application of "A Common Methodological Framework for Integrated Planning and Management in Mediterranean Coastal Areas".

Based on the available information sources, the Study identified the major resources of the Syrian coastal region (natural, economic, social and cultural), brought into focus the existing problems and conflicts with regard to the use of these resources, and outlined (following the analysis of regional potentials) the opportunities and constraints of an environmentally sustainable pattern of the regional growth and development.

Having clearly identified the problems, the Study suggested the measures for immediate action which were in harmony with the global planning concept outlined in the study.

3. STRATEGY, OBJECTIVES, AND MAIN EXPECTED BENEFITS AND OUTPUTS OF THE PROGRAMME

Generally speaking, the major objective of the coastal area management programme, carried out in the period 1991-1993 and later extended to 1994 to complete some of the activities, corresponds to the objective set for the previous period, that is, to use the method of integrated planning and management of resources to achieve a higher degree of harmony between the development and environmental protection of the Syrian coastal region. The knowledge obtained through the preparation of the Study points out the need to continue with the integrated approach to the interdependent problems of the economic and demographic development and the protection and promotion of the physical environment in which these occur.

3.1 Strategy of the Programme

The strategy of the programme departed from the assumptions discussed in the Preliminary Study and further elaborate them. The stress was shifted from a general view of individual activities to precisely identified problems and priorities, and through them, to the implementation of general development concepts as proposed in the Study. The selected problems and priorities, elaborated to various degrees, followed the general concept of integrated planning and management of resources.

Such a strategy required a selective approach to the identification of areas in which the majority of activities will be carried out. Since the problems of pollution, as well as development resources and potentials, were concentrated in the immediate coastal zone of the region, the programme focused on that particular area.

3.2 Objectives of the Programme

The general objective of the programme was to protect and rationally utilize the coastal resources over a relatively long period of time. The task of such a programme was to determine and recommend the management measures (particularly in the domains of land and sea use, environmental protection, rehabilitation of historic monuments, etc.) with a view to resolving the existing environmental conflicts and setting up the optimum paths of the future dynamic development.

3.3 Main Expected Benefits of the Programme

This programme was expected to provide the following benefits:

- improvement of the state of a number of ecosystems;
- incorporation of environmental considerations into planning activities and decision-making process;
- enhancement of the local capacities in solving various development and environment problems;
- transfer of knowledge from relevant international organizations to local institutions;
- practical verification of theoretical and methodological knowledge of MAP components;
- creating conditions for responding to some accidental situations.

3.4 Main Expected Outputs of the Programme

The following were expected to result as main outputs of the programme:

- proposals for immediate actions;

- technical and economic measures for addressing existing environmental problems;
- integrated management plans;
- studies and reports on the specific subjects;
- training of local and national experts;
- demonstration projects;
- monitoring programme;
- data base for various development and environment aspects;
- software to be used in solving some specific problems.

4. SUMMARY OF ACTIVITIES CARRIED OUT

Based on the check-list of activities for coastal areas management programmes prepared by MAP and discussed by the Sixth Ordinary Meeting of the Contracting Parties, and bearing in mind the specific conditions of the Syrian Coast, the following activities were implemented in the period 1991-1994.

4.1 Marine Pollution Monitoring Programme and Land-based Sources Protocol

As part of the CAMP for the Coastal Region of Syria, the MED POL National Monitoring Programme, ongoing since 1986 along the Syrian Coast, was recognized as the tool for the assessment of the quality of coastal waters which would contribute to the preparation of the management programme of the entire coast.

The MED POL Monitoring Programme of the Syrian Coast includes 59 stations in two geographical areas (north and south). The programme of monitoring covers coastal areas and bathing beaches as well as samples taken from the fish markets. In the coastal areas the parameters include heavy metals and halogenated hydrocarbons in biota and petroleum hydrocarbons and nutrients in sea waters. At the bathing stations, the programme foresees the determination of faecal coliforms.

Three are the laboratories designated to participate in the programme : the Central laboratory of the Ministry of Environment in Damascus, the Marine Research Centre in Lattakia and the Coast Centre in Lattakia. While the Coast Centre is responsible for the microbial monitoring in beach along the entire coast, the two other laboratories are responsible for, respectively, the Southern coast (Central Laboratory) and the Northern coast (Marine Research Centre).

As a result of the agreed working programme, pollution data were received on heavy metals in sea water and marine organisms and on micro-organisms in sea water.

The data on heavy metals in marine organisms, as part of the agreed programme in the period 1990-1993, refer only to samples taken from the fish markets of Lattakia, Baniyas and Tartous. The agreed coastal stations were not visited in spite of the agreement and the market samples were collected and analyzed only by the Marine Research Institute in Lattakia.

Considering the limited amount of data received, it is not possible to reach any conclusions on the trend of pollution along the Syrian coast. The data on heavy metals (cadmium, chromium, lead, zinc, copper, mercury) however, indicate that the levels of pollution is within the common range found along the Mediterranean. It is worth noting however, that the samples were all taken from the fish market which cannot guarantee the ultimate origin of the fish. In addition, the results show the coefficient of variation as $>50\%$, the reason for this big value being found in the heterogeneity of the organisms selected (organisms of very different sizes and collected during different months of the year).

The microbial data received over a two year period (1991-1992) include 32 stations covered by the Coast Centre in Lattakia.

Similar consideration can be made on the results of the microbial monitoring. Although in general the same stations were selected in the two-year period, a decrease in the total number of samples was noted from 1991 to 1992. Also, the frequency of sampling was not uniform and additional information such as the hour of sampling was not reported.

As to the results of the microbial monitoring, it seems that there are a number of areas both in the north and in the south where the central and local authorities have to pay special attention since the quality of the bathing waters, at least at the time of the sampling, did not seem to have an acceptable standard. However, in view of the irregular sampling frequency, the data analysis cannot lead to any scientifically acceptable conclusion.

The organization of the pollution monitoring programme in Syria has shown that a greater effort should be made by the Syrian authorities to strengthen the existing institutes in terms of infrastructures, personnel and equipment and ensure that the programme is implemented. The MED POL programme, within the limits of its modest budget, has provided scientific training, equipment, regular visit of experts and maintenance of the existing instruments, but it is not sufficient if an adequate monitoring programme has to be carried out all along the coast. A proper pollution monitoring programme can provide the scientific basis to the decision makers and planners for an environmentally sound coastal management and thus more attention should be given to the needs of the existing laboratories.

In conclusion, if the several years of implementation of the monitoring programme have somehow improved the local capabilities in carrying out sampling and analysis, it is believed that not enough emphasis is still given by the Syrian authorities to the role that the use of the results of a continuous monitoring system of the marine pollution can have in the framework of a coastal management programme. Therefore,

considering that the planning of the programme was prepared taking into account the local problems and the local capabilities, it is recommended that no efforts should be spared by the Syrian authorities to assist the selected laboratories in implementing the agreed programme.

As part of the CAMP Agreement a full programme of implementation of the provisions of the Land-Based Sources Protocol was prepared. In particular, the preparation of the survey of the LBS sources of pollution was considered as priority, considering the important implications that its results might have on other components, such as the pollution monitoring programme.

To this purpose, questionnaires to gather information on liquid domestic discharges, industrial discharges and oil discharges from refineries and reception facilities were sent to the Ministry of Environment for completion. A consultant also visited the country and assisted the Ministry in filling the questionnaires.

The work which was carried out resulted in the gathering of a number of information which contributed to the overall picture of the environmental problems of the coastal region of Syria.

The permanent population of Syria in coastal towns and cities resulted of 530.831 inhabitants. The increase during the summer season was not indicated. Out of the total population, 96.5% appeared to be connected to municipal sewerage systems, 1.5% to other sewerage systems, while the 2% used other ways of sewage collection.

All the waste waters are discharged into the sea. Of the total annual amount of waste waters (24.8% million cubic meters), 99% is not treated, and only 1% is treated secondary.

No indication was given as to the fate of the sludge generated by the secondary treatment.

The annual amount of solid wastes was reported as 144,880 tons. A significant amount of solid wastes (30.4%) is composted, and the remaining 69.6% is disposed on land.

If on the one hand it is necessary to say that this activity improved the general knowledge on the coast, on the other hand it should be stressed that the data are still incomplete and that additional efforts should be made to provide those information which were not included in the questionnaires.

With reference to the implementation of the provisions of the Protocol on LBS, it is important to stress that Syria should consider the twelve pollution control measures adopted by the Contracting Parties and translate the recommendations into national laws.

4.2 Implications of Expected Climatic Changes on the Syrian Coast

This project forms part of a wider, Integrated Planning Project for the Syrian coastal region undertaken within the framework of the Coastal Area Management Programme (CAMP) of the Co-ordinating Unit for the Mediterranean Action Plan. The report was prepared by a Task Team of national and international experts who were asked to evaluate the implications of future climatic changes and sea level rise on the coastal zone of Syria. The study was undertaken through a review of existing information and an expert evaluation of the likely implications of scenarios of future climate. These scenarios were developed by the University of East Anglia as part of the Mediterranean Co-ordinating Unit's wider activities in the field of climatic change impact assessment for the Mediterranean Basin.

The objectives of these studies were:

- to identify and assess the possible implications of expected climate change on the terrestrial, aquatic and marine ecosystems, population, land- and sea-use practices, and other human activities in the Syrian coastal region;
- to determine areas or systems which appear to be most vulnerable to the expected climate change; and
- to suggest policies and measures which may mitigate or avoid the negative effects of the expected impact, or adapt to them, through planning and management of coastal areas and resources;

using the presently available data and the best possible extrapolations from these data.

The Syrian coastal region occupies only around 2% of Syrian national territory but is home to 11% of the population and is of national importance in terms of agriculture, contributing about 11% to Gross National product. Energy production is high (35% of the national total) and some industrial activities such as cement production (38% of national production) and petroleum refining (50% of national total) are well developed in the region. International tourism is not well developed at present although the region has considerable potential in this regard. The coastal region is well supplied with transport links, including maritime, air and land based - roads and railways.

The climate is typically Mediterranean with cool dry winters and hot dry summers. The coastal region is dominated by the Jebel al Sahel mountain range which runs parallel to the coast some 20-40 km inland and affects the coastal climate. Rainfall increases from around 760-900 mm yr⁻¹ in the coastal plains to a maximum of 2000 mm yr⁻¹ in the mountains.

The soils of the area reflect the underlying geology which is dominated by limestones and dolomite and are of the typical Mediterranean red-brown types. Soils are generally deeper than 1m in the coastal plain. Fresh water supplies are adequate although some streams dry up during the summer. Irrigation is practiced on 16% of the cultivated land which covers in excess of a quarter of a million hectares.

The task team has established that there are considerable gaps in the data concerning many aspects of the coastal system, including amongst others. inadequate information on natural ecosystems, both marine and terrestrial, on oceanography and beach dynamics. In addition the socio-economic projections are inadequate to enable the development of accurate planning scenarios beyond a short time frame.

Under scenarios of climatic change, temperatures will rise, more in the highland areas than in the coast with consequent impacts on natural and managed ecosystems and agricultural production. It is believed that the frequency of extreme events could increase, particularly the frequency of torrential rainstorms with consequent increases in soil and slope erosion. The rather uncertain scenarios of future rainfall suggest that the region may be slightly drier than at present.

Under scenarios of moderate sea level rise (20cm higher than present) the vulnerability of the Syrian coastal region may be increased but the Task team concluded that the impacts of such a rise would be of less significance than the impacts of non-climatic factors. including population increase and present development trends. Small enclosed "pocket beaches" may be the most vulnerable coastal types to increasing sea levels.

Although water resources are at present adequate the hydrological system was seen as one which is vulnerable to the impacts of climatic change and sea level rise, particularly since the demand for freshwater is likely to rise with population growth and increased agricultural production. Water quality may be adversely affected by salinization of groundwater; vegetation cover may decline and soil erosion may increase in a warmer world, although these systems will be more affected by the other sources of change indicated above.

In planning for and addressing future changes in the Syrian coastal region the Task Team recommends that:

- enhanced programmes of data acquisition be initiated to provide a sound information base on present systems and processes as the basis for future planning;
- integrated approaches to coastal zone planning and management be adopted which include *inter alia* evaluation of specific sites to sea level rise and evaluation of specific alternatives for protection and or zoning of development and infrastructure;
- environmental impact assessments be undertaken for all major developments in the region; and,
- programmes of air pollution abatement, water resource management, renewal energy use, international co-operation and vegetation/land use mapping be implemented as soon as practicable.

On the basis of the results of the work of the Task Team, the following major impacts expected from the predicted climate change were identified:

- gradual acceleration in the next century of soil erosion and general modification of vegetation cover due to increased aridity;
- increased salinization (expected by 2030) of underground water due to increased evaporation during a longer dry season and to sea level rise; and
- erosion of beaches and significant damage to coastal structures and human settlements close to the shore will occur as a consequence of exceptional storm surges even if mean sea level rise is only of the order of 10 cm.

The following action was suggested to cope with the above mentioned impacts:

- **Problems of soil and coastal erosion and increased salinization should be dealt with through integrated coastal zone management and planning. Such planning should include development of water management plans, monitoring programmes; and, establishment of a data bank on natural and cultivated vegetation.**

4.3 Coastal Resources Management Plan

The Coastal Resources Management Plan (CRMP) is the result of co-operation of the Regional Activity Centre for the Priority Actions Programme (PAP/RAC) with the Syrian Ministry of the Environment, and other national institutions.

Basing itself on the principles of sustainable development and the criteria and procedure of integrated planning of coastal zones, the Plan recommends the management measures, particularly for land and sea use and the protection of the most valuable resources and areas of the Syrian coastal zone, aiming to contribute to the mitigation or elimination of environmental conflicts and to set path for a future development.

The immediate objectives of the CRMP were: (a) to train the national experts in applying the methodology of integrated planning and management; (b) to recommend the ways of implementing relevant legal instruments and existing institutional arrangements; (c) to contribute to the adoption of modern tools and techniques of coastal zone management.

The coastal zone covered by the CRMP is the entire coastal plain up to an altitude of 200 meters, the settlements on the hillsides, and the immediate gravity areas of the main coastal cities. The CRMP focuses on the protection and sustainable development of the coastal strip.

The main environmental problems of the coastal zone, mostly generated by heavy concentration of people (high natural growth and migration) and activities (intensive agriculture, heavy industry, transportation), are:

- * pollution of water resources and the coastal sea;
- * intrusion of saline water into aquifers;
- * clearing of indigenous forests and the resulting soil erosion;
- * extraction of sand from beaches (sand dunes) for construction;
- * none-selective use of pesticides, herbicides and fertilizers;
- * construction of dams which have arrested the replenishment of beaches with sand and gravel;
- * sprawl of illegal housing in suburban areas, and devastation of the fertile agricultural land;
- * ribbon development of bungalows along the beaches.

The following management policies recommended in the CRMP aim to control the development processes endangering the coastal environment, and to mitigate and, in some cases, eliminate the existing negative impacts :

Coastal land

- * afforestation and recovery programmes should be established, particularly in regard to the remaining indigenous forest species;
- * the prime agricultural land must be preserved as much as possible, and the coastal agriculture should be encouraged and controlled;
- * mining and quarrying should not be allowed in environmentally sensitive areas nor in the areas of high scenic value;
- * development priority should be given to the coast-dependent activities;
- * an orderly and balanced development of settlements should be encouraged and achieved by the concentrating of new housing and services around the traditional and existing settlements;
- * priority in development should be given to the neighbouring or satellite communities in order to avoid a sprawl of suburban areas in major cities;

Coastal strip

- * it is necessary to protect marine environment from harmful activities (eg. dynamite fishing);
- * destruction of special ecosystems (river banks and small estuaries) to obtain more agricultural land, or for other uses, must be stopped;
- * mining of sand dunes should be stopped immediately and the construction of dams, breakwaters, and other such structures that alter the natural shoreline should be permitted only when designed to maintain the shoreline sand systems (EIA studies);
- * protection and conservation of the coast in sections of the highest natural value must be given top priority;
- * priority has to be given to the development of coastal tourism provided it is in harmony with the resources it is based upon;

- * in selecting suitable locations for tourism development, priority must be given to the areas where such development has already taken place;
- * carrying capacity assessment should be made for each tourism activity;
- * in designating the use of the coastal sections (particularly tourism development), a resource-based approach should be adopted;
- * as regards the coastal landscape, new developments are proposed only if they respect the visual quality of natural or man-made areas.

The CRMP pays special attention to the vulnerability of water resources (surface and ground water), since the study area extends far beyond the coastal zone and corresponds to the catchment areas. Concrete measures have been proposed for the protection of aquifers and surface waters from activities which could have a harmful effect on the quality of water.

Proposals for the establishment of Specially Protected Areas are divided into three main categories:

- * Areas of ecological importance (ten areas);
- * Cultural landscapes (eight areas);
- * Traditional rural areas (two settlements within the protected areas);

Proposals for the protection of historic monuments distinguished two main categories :

- * Historic monuments of the world heritage (seven sites);
- * Historic monuments of importance for the national heritage (seven sites, mainly traditional rural settlements).

The main part of the CRMP is dedicated to the proposal of concrete management measures to be taken for various coastal areas, which were longitudinally divided into units having similar physical or functional characteristics : four coastal sectors, each comprising 2-3 smaller units - segments, which were divided into yet smaller units - sections. For each of these units a specific management policy has been recommended (concerning, among others, land-use, development and protection measures) and additional studies have been suggested

The CRMP also includes recommendations (general and technical) for its implementation.

4.4 Environmental Impact Assessment

An EIA of the planned Amrit tourism project was envisaged within the framework of the CAMP "The Syrian Coast". Considered as a very important project on the coast, Amrit was selected jointly by the Ministry of State for Environmental Affairs and the Ministry of Tourism.

The site is located in the immediate vicinity of the remains of the ancient town of Amrit, some 7 kilometers south of Tartous which is the second largest coastal city

in Syria. The surface area of the site is about 42 ha. Its average width is 600 m, while the length of the sandy coastline is approximately 800 m. According to project, the area was to contain close to 2.000 tourist beds in high-category hotels and villas.

A team of national experts (from Ministry of Tourism, Ministry of Environment, and University of Lattakia) was put together with the assistance of a PAP consultant, with the task to make an EIA of this tourism project. In preparing the EIA, the team used the procedure which had been developed by PAP/RAC, in cooperation with OCA/PAC and MEDU, and which had been published as UNEP Regional Seas Reports and Studies No 122.

The Environmental Impact Assessment was being made with the assistance of the PAP consultant who went on mission to Syria three times for that purpose. During the first mission, the team of national experts was explained the role and place of the EIA in the planning and decision-making process, as well as the proposed EIA procedure. Agreement was reached as to the mode of preparing the EIA, and data which had to be collected. During the second mission, the PAP consultant made an evaluation of the accomplished work and instructed the national team how to complete the EIA report. Evaluation and amendments of the EIA report were made during the third mission.

The activity ended in a training course on EIA addressed to various national experts who had not been involved in the preparation of the EIA. The trainees were informed of the role and place of EIA in the planning and decision-making process, explained the EIA procedure, presented the Amrit EIA document, together with other selected EIA documents which had been prepared in the framework of PAP activities.

In addition to the activities related to the preparation of EIA for the Amrit tourism project, the PAP consultant provided assistance to the experts of the Ministry of Environment in the resolution of many problems encountered in planning and dealing with various other projects, as well as helped them in the preparation of national regulations relative to the preparation of EIAs.

The realization of the Amrit project was discontinued shortly after the earthworks started, because some important remains of the ancient city had been discovered.

4.5 Training Programme on GIS

The most comprehensive of all CAMP activities is the preparation of the Coastal Resources Management Plan (CRMP) since it envisages quite a few outputs and necessitates the collection of quite a number of data, and elaboration of the accompanying thematic documents. To be able to handle this large amount of information, a training programme on the computer-based Geographic Information System (GIS) was initiated. The activity started in September 1990, in an orientative course on GIS

The training programme on GIS had the following main objectives :

- * to install the appropriate hardware-software configuration;
- * to implement the training programme for the local GIS team to introduce them to GIS technology and help them master the pcARC/INFO software;
- * to create a realistic and manageable GIS database accommodating the modelling capabilities of pcARC/INFO; and
- * to provide a basis for the application of GIS on the regional level in support to a part of planning activities within the Resources Management Plan of the Syrian Coastal Zone.

The training programme on GIS was implemented in four phases. The first phase included an orientative course for the organizers of GIS applications in Syria. The course was held in Split, in September 1990. and it lasted two weeks. It covered the basic concepts of GIS and introduced two software products: pcARC/INFO and IDRISI.

The second phase included a basic training course for the local GIS team in Damascus with the practical application of pcARC/INFO. The course was effectuated through two missions. The first mission had the task to install the pcARC/INFO software, release 3.3. These two missions were an introduction to the basic concepts and operations of pcARC/INFO providing the essentials required for a GIS beginner. The main task of the missions was to provide the trainees with basic GIS skills enabling them to conduct their own pilot project.

The third phase (effectuated through another two missions) was dedicated to the establishment of a regional GIS database for the Syrian coastal zone, and to the advanced capabilities of pcARC/INFO. The first of the two missions concentrated on the important aspects of GIS project design covering the basic steps for the creation of a workable GIS database, as well as on the explanation of the problems of data base automation and editing rules using pcARC/INFO. In addition to training, the objective was to develop the basis for a realistic and manageable GIS system for the regional-level planning using pcARC/INFO. The second mission included the installation and presentation of the new commands introduced in pcARC/INFO, release 3.4D, and an advanced training course on the capabilities of Simple Macro Language as a tool for interactive applications.

The fourth phase (the 10th mission) included advanced topics concerning the design and establishment of GIS data bases. This phase of work was effectuated with the support of GRID-Nairobi and was seen as the start of a GIS project for the city of Banyas.

The training of local GIS experts in Syria was performed on personal computers with the software support of the pcARC/INFO package (product of ESRI - Environmental Systems Research Institute, Redlands, USA), the Priority Actions Programme Regional Activity Centre (PAP/RAC) provided, in cooperation with UNEP-GRID and UNITAR-Geneva, the software for educational (non-commercial) purposes, while the Syrian Ministry of Environment and the General Organization for Remote

Sensing (GORS) provided the appropriate hardware configuration and met other technical requirements.

The prepared GIS database was grounded on the perception of development environment problems, as well as on data availability and quality. It should be noted that the framework for the development of this database was defined in close cooperation of PAP with the local planning team and the GIS team. It, thus, can be viewed as a computer-based geoinformation system designed specifically to meet the needs of planners in the site suitability assessment for coastal zone management and land use planning.

As a part of the training activity, but targeting on the support for the preparation of the Coastal Resources Management Plan, a GIS model was developed of attractiveness for urban/rural growth in the coastal region of Syria. The model contains all major GIS functions. Its application served as a basis for practicing the fundamental GIS spatial operations as well as an illustration of the models of attractiveness which were rather easy to conduct by pcARC/INFO.

Having evaluated the GIS training programmes, it was decided that the local GIS team understood and mastered the basic concepts and elements of pcARC/INFO from both technical and planners' points of view. It was also felt that the GIS activities should be continued aiming to support the preparation of the Integrated Planning Study for the City of Damascus and similar studies for tourist areas on the coast. Also, strengthening of the hardware equipment and properly placing the GIS group within the organizational scheme is considered of great importance.

The main results of the GIS training programme may be summarized as follows:

- * A small GIS lab has been set up in the offices of the Ministry of State for Environment. PAP/RAC, in cooperation with GRID-Nairobi and UNITAR-Geneva provided the pcARC/INFO 3.4 software for educational purposes, while the Ministry of State for Environment and GORS provided an appropriate but low-budget hardware configuration and met other technical requirements. At the moment, the improved GIS lab at GORS is equipped with the two 80386-based microcomputers (a 80-Mb hard disk, co-processor, etc.), a small tablet (used as digitizer), a 4-pen plotter and a 24-dot matrix printer. The equipment is suitable for pcARC/INFO and limited GIS analyses, except the digitizer whose small format (A4) makes data input for the selected study area a very tedious work.
- * Taken as a whole, the GIS training programme enabled an introduction to many related but complex subjects which come together in GIS. The participants in the programme were presented the fundamental concepts in using pcARC/INFO, making possible an objective decision to be made on the system acquisition and implementation. During the training course, 12 trainees from various institutions were able to see the usefulness of the GIS technology for a range of planning applications including information retrieval and mapping, site selection and land

suitability analysis involving a routine processing of spatially oriented data. Also they got to know the basic operation of pcARC/INFO and showed great enthusiasm to master them.

- * Another benefit of the completed activities is related to the establishment of a realistic and manageable GIS database, and user-friendly interface for determining the urban growth attractiveness model. This supplemented the lecture topics on important aspects of a GIS project design and modelling capabilities of pcARC/INFO. It also provided a core of the information system for macro-level GIS applications in support of planning activities, such as those within the context of the Coastal Resources Management Plan.

4.6. Development/Environment Systemic and Prospective Approach for the Syrian Coastal Region

The Blue Plan systemic and prospective approach, including preparation of scenarios, intends to highlight the opportunities and conflicts which may arise between development and environmental protection on the Syrian coast in the future.

Its basic position is that future development of the Syrian coast is likely to cause significant environmental effects, if not carefully planned, which are likely to affect the development potential of the Region.

The Syrian Coastal Region has significant advantages at a national and possibly at an international level as well. The former relate to its favorable climate and rich water resources which render it suitable for agriculture and recreation/tourism. The latter stems from the strategic position of the Region as a gate of Syria (and adjacent Arab countries) to the Mediterranean and European markets.

Four seem to be the major dimensions or axes of reflection concerning the future of the Syrian Coastal Region:

Geopolitics : As the world economy becomes increasingly interconnected and globalized each country seeks to maximize its linkages with the world markets. Comparative advantages play a significant role in this respect.

Economic growth : The macro-economic factors are important in this context. High growth rates of the past are not likely to continue as the world economy is hit by recession. The recent collapse of Syria's traditional market (Soviet economy) has worsened the situation.

Society : Population pressures are likely to be high although some indications exist suggesting lowering of fertility rates as the population becomes urbanized. Population growth is likely to bring forward unemployment problems.

Environmental quality : Environmental resources are not abundant in the Coastal Region. The beach areas are limited given the size of the country. If developed at the rates of the past decades they will soon become saturated and environmental quality will decline unless substantial investments and efforts would be directed to control urban development. Land resources are not abundant, particularly as agricultural areas should be protected as key national resource. Population pressures will result in urban development and further concentration in the narrow coastal strip or the intermediate hill areas. Water resources, although abundant at present, become increasingly threatened.

Three scenarios, or coherent combinations of options, have been identified. Each scenario has differential impacts on the environment but also in each scenario the environment holds a key role in the future of the Region :

In the case of the trend scenario, conflicts over the use of water and land resources are likely to be the major environmental problems. Particularly the concentration of development in the coastal zone will create significant functional problems (conflicts with agricultural production, congestion, lack of access, overload of infrastructures, etc.). In the intermediate zone development pressures are expected to be high from the expansion of agriculture. Such intensive development is likely to require significant investments in infrastructure and in efforts -on the part of the administration- to overcome such problems. In view of the generally high pressures and meager resources -financial and other- associated with this scenario, environmental problems will worsen. Water resources could be threatened by sprawling development and overuse. Pollution problems could be worsened as a result of uncontrolled agricultural practice and urban waste.

Land for agriculture most probably will not be effectively protected and will be lost to other uses. Natural areas of interest could be threatened. However one of the most significant problems could be uncontrolled development, mainly on the coast. The degradation of the environment will be the result of unresolved conflicts of use and lack of control. A lower environmental quality is likely to affect in the medium and long term the economic prospects of the Region in agriculture and tourism, eroding its competitive edge.

In the case of the efficiency scenario conflicts over the use of land and water are also likely to be the major issues including pollution. Two areas are most likely to suffer the most, the coastal zone and the intermediate hill area. The anticipated expansion of agriculture and agri-industry, as well of other industries and services, will lead to concentration of population, employment opportunities and activities -all associated with urban development- along the major transport axes and around the large urban centres, in the coast zone and to a lesser extent the hill area. Significant irrigation and dam construction projects should be expected. Pollution and congestion should be expected. Pollution of

sea water and drinking water could be serious. Streams could be polluted. Natural areas are likely to be threatened. In the agricultural areas of the coastal zone pressures will be strong for expansion of agriculture intensifying conflicts with other uses (i.e. urban development as discussed earlier). Water supply shortages could be possible, even. Overall significant problems of degradation of the environment are expected due to intensive development and conflicts. Significant efforts will be required to guide and control development, putting tremendous pressures on administrative, financial and social structures. The pace of development could exceed the capacity of local societies to adapt to change. Furthermore, the conflicts over the use of natural resources, the overexploitation of water and land resources and pollution could in the long-term threaten the development of agriculture and tourism and the quality of life in the coastal Region. Prospects for development could be also eroded significantly. In the case of the sustainable development scenario pressures on the environment are likely to be moderated by the slower pace of changes -and associated development- and by strong preventive action in environmental management. Pressures for development are likely to be not only lower but also diffused over geographic space. The coastal zone is expected to face the highest pressures for development, the hill area moderate pressures and the mountain area lower pressures. The rational use of water is likely to prevent excesses in dam construction and careless expansion of irrigation and water supply schemes. Urban development is likely to be contained if not fully controlled. Development could be guided to the urban centres of the coastal zone and the hill area while some development is also likely to be directed -and supported- in the mountain area. The coastal zone is likely to be protected better from encroachment and development. If significant effort is invested at present in environmental protection and management future problems could be manageable although administrative structures need still to be strengthened.

In summary, environmental impacts are expected under any scenario. These can be mitigated through environmental policy. Significant steps have to be taken at present to anticipate and prevent the possible negative impacts in the future.

The comparative analysis of the scenarios for the Syrian Coast suggests that there are key issues which should be seriously considered at present in order to achieve long-term prosperity in the Region as defined from the perspective of a strategy towards sustainability.

Three issues seem to be of highest priority, a common priority in all scenarios:

- Water resources, mostly rationalizing the expectations through a careful assessment of supply and demand

- Natural habitat areas which are threatened, particularly on the coast through early protection measures
- Urbanization, particularly the uncontrolled sprawl of urban development on the coast, along the major transport axes and in agricultural areas near the large urban centres, through land-use and land development controls.

All these should be approached in a systemic and coherent way through planning and management. The institution of a coastal management programme seems inevitable if the coastal Region of Syria is to attain its potential without eroding its future

4.7 Specially Protected Areas

Following a request made by The Minister of Environment in Syria, RAC/SPA realized a mission in June 1994 to evaluate the possibilities of establishing coastal or marine protected areas. In close cooperation with the National Focal Point for SPA, RAC/SPA is preparing a workplan for the preparatory steps to the proclamation of a protected area covering site, identified as area of high natural interest.

The expected next steps are :

- (1) identify the suitable boundaries and zoning of the protected area:
- (2) draft in conformity with the relevant national legislation proposals for the needed legal acts;
- (3) identify the main threats; and
- (4) outline a management plan.

It was agreed to consider this project as pilot project which could be extended in the future to other sites

The objectives and the expected benefits of the above mentioned programme are believed to be in line with the objectives of the item "7.10 Specially Protected Areas" of the CAMP Syria Agreement.

In case of availability of funds RAC/SPA expects to start the OUMTOYOUR project early next year.