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Report On:

TRAINING COURSE ON THE USE OF DECISION SUPPORT SYSTEMS FOR ENVIRONMENTAL MANAGEMENT IN COASTAL AND DRY AREAS
Damascus, Syria, 20-22 September 1999.

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Background

Decision makers in the in the government, private industry, and other public agencies are confronted daily with a host of pressing social, economic, and environmental problems that were increasingly complex and difficult. To meet the challenges for addressing these problems, various environment decision-aiding tools have been developed. Most of these tools are based on the use of information in support of the decision-making process. The revolution in information technology have made available information tools which enable us to capture, manipulate, analyze and present information in products that can be readily used and understood by decision makers, managers, planners and the public. In other words, complex technical information can be transformed into meaningful information products that can be comprehended by decision makers and the public.

Among decision-aiding tools is Decision Support Systems which are information systems to provide decision makers with information on which to base informed decision. These systems focus on supporting rather than replacing the user's decision making process. For decision support systems to have a profound impact on decision makers activities, they should be integrated into an organization's decision making culture and process. The use of DSS in support of environment decision is fairly new, and most environmental institutions in developing countries have no or weak capacities to utilize such systems. This is evidently true in the Arab Region and the developing countries of the Mediterranean. Thus, these institutions required extensive capacity building on the use of these technologies. Recognizing this need, the Centre for Environment and Development for the Arab Region and Europe (CEDARE), and the International Centre for Science and High Technology (ICS-UNIDO) agreed to organize jointly a training course to address this need. With interest and experience shown by the Ministry of Environment in Syria, it was agreed to hold this training course in Damascus (Arab Republic of Syria) to be hosted by the Ministry of Environment under the patronage of H.E. The Minister of Environment.

The application of DSS in environmental management of coastal and dry areas was of great relevance to the countries of the Arab Region and Mediterranean Europe, as they are under increasing pressure from wide range of competing demands. Coastal decision makers were confronted with developing planning solutions to accommodate these multiple and often conflicting demands.

II. Rationale

The objectives of the training course were to assist in capacity building of specialists at technical and managerial levels to use Decision Support Systems for Environmental Management in Coastal and Dry Areas in issues relating to industrial development and its environmental implications. More specifically it is to:

- evaluate the applicability of GIS technology for monitoring industrial development and pollution in industrialized urban-coastal areas and for optimal industrial siting.
- avail the role of production process simulation techniques to chemical industries.
- present case studies from the Mediterranean region, particularly those concerning "hot spots" as already identified by the Mediterranean states.

- integrate the tools of decision domain (GIS, RS, IP, PS and ES) to plan sustainable industrial development.
- strengthen the network of institutions, from Mediterranean developing countries, working on the industrial development of coastal areas.
- elaborate case studies for planning redemption of industrial pollution due to inadequate process management as well as to disasters.

III. Participation

The Meeting was organized in Damascus, Syria by the Centre for Environment and Development for the Arab Region and Europe (CEDARE), and the International Center for Science and High Technology, ICS-UNIDO in collaboration with the State Ministry of Environmental Affairs in Syria. It was attended by 21 participants from 14 countries; namely, Egypt, Jordan, Kuwait, Lebanon, Libya, Malta, Morocco , Oman, Qatar, Saudi Arabia, Sudan, Syria, Tunisia, and Yemen. Eight international organizations and agencies also attended the course, namely; AOAD, CEDARE, ICARDA, ICS/UNDO, Malta Planning Authority, PAP/RAC, UNEP/ROWA, and TETRA/Tech.

IV. Day One

A. Opening Session

The Opening Session commenced with the speech of Dr. Kamal A. Sabet, CEDARE Executive Director. Dr. Sabet expressed that he is pleased and honored to address the distinguished gathering who attended the opening session. He thanked the Ministry of Environment in Syria for hosting the meeting in Syria, the land of history and hospitality. He expressed his gratitude to the ICS/UNIDO for co-sponsoring this event. He also thanked the guest speakers from various organizations.

Dr. Sabet stressed the importance of the topic of the training course, and the needs of decision-makers for decision support tools, which assist them make informed decisions. He then stated the objectives of the training course, and emphasized CEDARE's commitment to assist the capacity building of the region to use various information tools to support the decision making process. He concluded by reiterating CEDARE's thanks and gratitude to all the attendees and wished them successful deliberations.

Mr. Gennaro Longo, programme officer, ICS/UNIDO, gave the second speech. He welcomed the participants and stated that he was delighted to organize this training course in Syria, in collaboration with CEDARE. He also expressed his thanks to the Ministry of Environment in Syria for its great support in organizing the training course in Damascus.

Mr. Longo elaborated on the excellent and long relation between ICS/UNIDO and CEDARE. He explained that the similarities between the programmes of Unit in ICS/UNIDO and CEDARE gave a good momentum to co-organize this training course jointly.

He also emphasized on the importance of the topic of the training, and indicated that he would present during the deliberations of the course the importance of process simulation as a very useful and advanced informatics tool for chemical engineers.

He then thanked the participants and wished them a successful training.

His Excellency the Minister of Environment, Mr. Abdul Hamid El-Mounajed, made the concluding speech in the opening session.

H.E. Mr. Abdul Hamid El-Mounajed welcomed the participants and expressed his thanks and gratitude to CEDARE for its continuous and appreciated efforts in the field of environmental protection in CEDARE Region. He also thanked ICS-UNIDO for their co-sponsoring the course. His excellency indicated that the environmental impact assessment unit in the ministry is undertaking a serious constructive role in protecting the environment in Syria from the impact of projects. He also indicated that the government was dealing and treating the various environmental problems concerning the protection of its water, land and air by adopting modern environmental techno. His excellency appraised the organization of this training course as it would assist in the efforts to conserve the environment.

H.E. the Minister indicated that the rise of concern of the global environment arised from the threats to life on our planet. He stressed the importance of cooperation in the Arab Region in the field of Environment and addressed the issue of water scarcity as one of the main environmental concerns in the Arab Region.

He concluded by thanking all the participants and wished them a pleasant stay.

B. Session I

Overview of ICS-UNIDO.
Eng. Gennaro Longo, Earth, Environmental & Marine Science & Technologies-ICS/UNIDO

Mr. Longo started his presentation by demonstrating the ICS-UNIDO legal framework, how it was funded, and its institutional structure. The speaker emphasized on the co-operation between ICS-UNIDO and other different International Organizations giving an example of the current event as an excellent model for co-operation. The presentation also gave an overview of the main objectives of ICS, its general framework, training activities, fields of activity for each programme and sub-programme.

Overview of CEDARE.
Dr. Adel Farid Abdel-Kader, CEDARE

In this presentation, Dr. Abdel-Kader introduced the Centre of Environment and Development for the Arab region and Europe, its mandate, institutional setup, and programmes. He then gave some details on the Environmental Information Unit as the body in CEDARE responsible on information activities and the organization of this training course. He spoke of the Unit main functions, and activities. He then elaborated on some of the services and examples of the information products that the Unit have produced, such as the production of a CD containing CEDARE web site and GIS database covering the entire Arab region at regional and national scales, and some selected hot areas.

Discussion

A question from the floor addressed whether CEDARE is concerned with the issue of climate change. Dr. Abdel-Kader answered that while the topic is very important, it is not one of CEDARE main activities, and explained that it could be considered if the countries and the Technical Advisory Committee of CEDARE would see the issue as a priority topic for CEDARE to work on.

The Coastal Zone - An Integrated Approach to Planning for Its Conservation.
Mr. Louis Cassar, Scientific Advisor on Coastal Zone Management - Earth, Environmental & Marine Science & Technologies-ICS/UNIDO

The paper gave an overview of the major issues and constraints pertaining to the Mediterranean Region and highlighted the dire need to promote conservation of coastal areas within an integrated resource management programme.

Furthermore, the paper reviewed approaches to ecosystem management through established norms of system planning. The importance of including all key stakeholders, including affected locals, NGOs and resource users - together with specialists and government officials - in the decision-making process, from the initial stage, was strongly advocated. Management objectives stemming from international accepted zoning and delimitation criteria, particularly those based on IUCN and biosphere reserve guidelines, were also cited.

C. Session II

Decision Support Systems Concepts and Definitions
Eng. Ahmed Abdelrehim, The Centre for Environment and Development for the Arab Region and Europe (CEDARE)

The presenter started by explaining the structure and the objective of his lecture. Mr. Abdelrehim explained that the main objective of the presentation was to give an overview of the Decision Support Systems, how they were evolved, why and when they should be used. The lecturer gave a brief historical background on the evolution of information systems then moved to various definitions of DSS. The lecturer put some emphasis on the Decision making process, nature and scope of decisions, and its anatomy. Mr. Abdelrehim finished his presentation by giving brief description of group decision support systems and concluded with some examples of group activities and group thinking.

Discussion

Several questions were raised asking about whether it was mandatory to use such systems in case that a problem existed. The lecturer clarified that the problem might occur in the phase of taking the decision due to the complexity of having several alternatives for each case.

Another question was raised asking if the use of GIS, Remote Sensing and other different tools could enhance the decision-making process. Mr. Abdelrehim explained that these tools were definitely important, but we should carefully choose the major tools and information to

avoid going into minor details that may lead to distraction from the original objectives and each case should be analyzed solely.

Information in Pollution Management and Spatial Decision Support.
Dr. Adel Farid Abdel-Kader, CEDARE.

The speaker gave the objectives of his presentation as; to introduce the concept and importance of the use of information in pollution management, introduce GIS and Spatial Decision Support Systems. He addressed the role of information within the new approaches of pollution management. He explained the role of information in formal regulation in three main areas; monitoring, technical analysis, and policy analysis.

The lecturer spoke of the basics of geographic information systems; including definitions, uses, representation in computers, benefits, components, and some GIS analysis functions. He then elaborated on the integration of GIS with DSS into Spatial Decision Support Systems. He explained the main characteristics of SDSS, and who are the users. He mentioned that examples of these systems are now being used on the Internet to support the public participation in environment decision making. He concluded by showing examples of the use of GIS in decision support.

Corporate Data Management for Effective Decision-Making
Mr. Mathew Gatt, Planning Authority, Malta.

Mr. Gatt started by explaining the importance of the intellectual capital as a key asset in the organizations. The presentation focused on the rapid change in operating environment that demand flexible organizations. The lecturer summarized the data-information. Knowledge value chain, intellectual capital and knowledge management were presented and explained what knowledge was. Mr. Gatt also discussed the corporate Data Model explaining what information needed to be held and what relationships needed to be modeled.

Discussion

A question was raised asking if the Planning Authority of Malta was providing GIS and other data sets to public and private sectors. Mr. Gatt explained that the Planning Authority provided these data sets with fees for the public.

V. Day Two

A. Session III

Process Simulation
Eng. Gennaro Longo, Earth, Environmental and Marine Sciences and Technologies - ICS-UNIDO
Mr. Longo presented the most important Decision Support System used in ICS for Environmental Pollution Management. He outlined that GIS and Remote Sensing are monitoring tools, while Process Simulation allows the study to reduce and/or eliminate the source of pollution and to recover the relevant damages. He mentioned that process simulation is an advanced informatics tool to be used by Chemical Engineers. He defined

process simulation as a tool for chemical engineers that enabled to predict the behaviour of a chemical process and to design accurately a chemical plant. He briefly talked about the evolution of process simulation. He then detailed its applicability to research and development, process design and production. The lecturer also explained the basic engineering design. He showed process simulation programme structure, and stated the main logic procedure of utilization. To conclude with, he indicated that process simulation was a simple and helpful tool to be used by chemical engineers that fully understand the process.

Discussion

Questions were raised about several topics related to the role of process simulation and how it could be used in the decision support systems. Mr. Longo explained that Process Simulation is used in the design phase to evaluate among the available technologies the best process for a required production in a particular country or to study a new process. He added that in production phase, Process Simulation can be used to study how the operating conditions have to be modified in order to get a different production or to treat a different raw material, which composition is seldom constant in the time He further noted that current studies at ICS address the link between PS and DSS. The lecturer also explained that the ICS was preparing a database of technologies that could assist decision makers with the most appropriate technologies.

DSS for Coastal and Dry Areas - PAP-RAC Experience (A GIS-based DSS for Fuka-Matrouh Coastal Zone , Egypt).
Dr. M. El Raey, Dean, Institution of Graduate Studies and Research, Alexandria University

Dr. El-Raey introduced the area under study including some of the physical and socio-economic attributes. He described the key problems of the area as shortages of fresh water resources, unplanned development, lack of awareness, low income, overgrazing and desertification. On the other hand, he highlighted the main advantages of the area including potential water resource, excellent tourism capability, and the virgin lands.

He then spoke of the main projects, that have been implemented in the study including the use of remote sensing and GIS in suitability analysis, carrying capacity assessment, integrated coastal area management plan, and strategic Environmental assessment. He explained the use of multi-criteria decisions for grazing and tourist lands. He elaborated on the benefits of the projects carried out. At the end, the lecturer presented a number of specific projects for future activities.

Discussion

Some questions were raised mainly to addressing the role of the local community versus that of the government, and the concerns regarding the sustainability of water resources and potentiality for cultivation.

Application of GIS in Coastal Management: Case Study of Bahrain
Dr. Asma Abahussain and Dr. Ismail Madany, The Arabian Gulf University, Bahrain.

Dr. Abahussain started her presentation by highlighting the main physio-graphic features and some socio-economic background. She gave an overview of industrial zones and coastal reclamation activities, and major regional sources of pollution in the Coastal environment in Bahrain. She further addressed the local human impact on the coastal environment.

The Lecturer also described the biological characteristics of the coastal zone, and reviewed the coastal management and development efforts in the country.

She then focused on GIS applications in coastal management and development and gave some specific examples; such as the Marine Environmental Geographic Information System or MAREGIS; The Tubli Bay Atlas; and the North Sirta Industrial Area. The Lecturer finally addressed the topic of GIS and climatic change in the next millennia.

Discussion

Questions were raised asking about solid waste management, desalination plant, reaction of the local authorities, current legislation and the problem of sea level rise.

Dr. Abahussain answered that the dumping method was used in Bahrain and the solid wastes were dried and used as fertilizers. For the salinity, she clarified that the water salinity was high and desalination process was used. The lecturer also replied that for the local authorities reacted to remedy some of the negative impacts. She explained that there were laws to stop reclamation and signs were put to stop the dumping process. She further pointed to the problem of sea-level rise by stating that the shallow area was only 2 metres in depth and the reclaimed area could be subjected to sea-level rise.

Use of GIS & Incremental Analysis for Decision Making in Environmental Ecosystem Restoration.
Dr. Khaled Abu-zeid, Tetra Tech/Infrastructure Southwest Group.

The presentation focused on the use of Geographic Information Systems (GIS) and Incremental Analysis for Decision-Making in Environmental Ecosystem Restoration projects. Dr. Abu-Zeid explained how GIS can be very efficient in easily extracting information about parcels affected by the Right-of-Way Take Line for implementing ecosystem restoration projects. The use of GIS in evaluating environmental habitat benefits of ecosystem restoration projects was also explained in his lecture. The use of GIS and Incremental Analysis models for comparing costs and benefits of different project alternatives was also presented.

B. Session IV

A Decision Support System for Environmental Impact Assessment of Irrigation Projects in Arid and Coastal Areas.
Dr. Khaled Abu-zeid, Tetra Tech/Infrastructure Southwest Group.

The main objective of this paper was to present an Environmental Impact Assessment Decision Support System (CEDARE-EIADSS) for irrigation projects that Developed by the speaker, and sponsored by the Centre for Environment and Development for the Arab Region

and Europe (CEDARE). Dr. Abu-zeid explained that the CEDARE-EIADSS software is a Personal Computer model operating under Windows environment and It was developed for the comparison between irrigation project alternatives based on all relevant aspects of the surrounding environment of an irrigation project. He added that It is intended for use by specialists or non-specialists high-level decision-makers.

The lecturer emphasized that inputs to the EIADSS include selected answers for a set of multiple choice questions that provide sufficient information to describe the baseline conditions and the general design for several project alternatives. He also explained that an Expert System was built into the EIADSS to translate the multiple choice answers to positive and negative scores reflecting the expected impact. Other inputs to the EIADSS include estimated parameters required to calculate economic indicators. The presenter clarified that the EIADSS outputs, in the form of positive and negative scores, allow the user to evaluate different impact criteria on neighboring and project areas and that the different criteria impacts are categorized as Natural Resources, Biological Life, Socio-Economics, Political, and Economics impacts. Dr. Abu-zeid described that final output is an overall environmental index for each project alternative. He added that the EIADSS is an efficient tool for supporting the decision making process, especially in the trade-off between project alternatives according to anticipated environmental impacts including economic aspects. He concluded that although this EIADSS was developed for irrigation projects applications, the software was designed in a flexible manner to allow for future adaptation to other applications using the same technique.

View on the Status of the Lebanese Experience in remote Sensing and GIS for Decision Support Systems"
Dr. Mohamaed R. Khawle, Director, National Centre for Remote Sensing, Lebanon

Dr. Khawle introduced the coastal zone of Lebanon through maps and satellite images. He spoke about the selective characteristics of the coastal zone and highlighted some examples of major geo-environmental concerns.

Integrated planning was emphasized in Dr. Khawle's presentation. It dealt with data availability and generation, technical capabilities in Remote Sensing and GIS, and environmental assessment. The presentation included example from Tripoli Region.

Dr. Khawle concluded his presentation by addressing the decision support systems in the Lebanese framework, including risk management and institutions with environmental responsibilities; monitoring, demonstration examples of environmental stress in coastal area, and decision goals and requirements.

General Discussion

Several questions were raised about the EIADSS that was presented by Dr. Abu-zeid. The participants asked for more clarification about the magnitude of the impact mentioned in the software, the applicability of relocation of some Habitat and the availability of the Software. Dr. Abu-zeid clarified that the Magnitude in the software was defined by the score and the significance of the impact was reflected by the weight. Freallocation of some species, he answered by stating that this option could be applicable for some species like animals while it hardly could be done for other species like fish. For the availability of the software, he

explained that the software was finalized but few adjustment needed to be done and would be ready for distribution.

Another question was raised about the possibility of loosing some information due to the fact that this model was a qualitative model. The lecturer clarified that the objective of the software was to enable users to differentiate between alternatives which would give the decision maker the opportunity to look for mitigation methods. Final question was raised about the large percentage of urban expansion in Tripoli, about 35%. Dr. Khawle explained the large percentage of urban expansion, due to the area covered by the International Fair.

VI. Day Three

A. Session V

The Syrian Experience in Using Decision Support Systems.
Eng. Yahia Awaidah, Ministry of State for Environmental Affairs - Syria

Eng. Awaidah used an interactive approach in making his presentation to involve the participants in discussions. He first addressed the problems raised in decision making; such as lack of data, lack of experience, lack of coordination, interest interference and conflicts among sectors. He reviewed the use of various DSS elements in the Ministry of Environment including environmental databases, integrated environmental planning using GIS, introducing the Industrial Pollution Control (IPC) Decision Support System of the World Bank, preparing strategy and action plan, and drafting environmental law. He then mentioned the various outputs of using DSS, such as proposed land use for the coastal region, environmental action plan, EIA procedure and decree environmental basin's profile, environmental auditing for old industries using IPC, and sanitary map of Syria. The lecturer used several maps to illustrate the DSS activities in Syria.

Case Study: DSS for Lake Maryut
Eng. Ahmed Abdelrehim, The Centre for Environment and Development for the Arab Region and Europe (CEDARE)

The lecturer started by defining the role and concepts of Public Participation in Environmental decision making, then he demonstrated the case study of Lake Maryout that received the effluents of 40 major industries and many other small industries, in addition to a high concentration of municipal activities and subsequent pollution. Mr. Abdelrehim added that there were over 7,000 fishermen exploiting lake Maryout's fishery resources, which declined five-fold in 20 years. He added that the lake was subject to filling parts of it, industrial, agricultural and sanitary wastes and urban expansion.

The lecturer summarized the objectives of the DSS which were to illustrate the concepts of DSS for environmentally sensitive areas, to demonstrate the methodology to assess the main policy failures behind improper urban management systems leading to deteriorating livelihood conditions and to simulate the discussion on public participation in decision making.

Mr. Abdelrehim demonstrated the final product which was a software that illustrated how information system and DSS could be applied in analyzing and solving the complex

environmental problems in a user-friendly environment. He also illustrated how the system allowed decision makers to compose different scenarios and strategies for the different types of external development that might affect the evaluation of the current situation in the study area.

Case Study: Structured Compensation Decision Making Using GENGIS
Mr. Mathew Gatt, Planning Authority, Malta.

Mr. Gatt explained that the value of Decision Support Systems was inherently linked to the extent of knowledge representation which was modeled by the system. In this case study, the Petroleum Development Organization of the Sultanate of Oman required a mechanism for developing a system for more efficient calculation of compensation for expropriation of sufficient land for laying a new oil pipeline. A powerful GIS application was developed as a tool for collecting all the necessary information and analyzing the "Knowledge" involved in assessing compensation. The resulting product required twelve man months of analysis, development and deployment to achieve significant results for the company. Benefits of the new system could be outlined as: a reduction in the time necessary to estimate compensation by a factor of 10; a GIS based system that enabled access to all the relevant information on each effected property.; an audit trail for each property and the relevant compensation analysis; and enabling technical operators to calculate compensation as opposed to legal professionals.

Integrating Remote Sensing and GIS in Decision Support: Case Studies
Dr. Adel Farid Abdel-Kader, Advisor - CEDARE

Dr. Abdel-Kader presentation included two case studies. The first one was entitled *"Integrating Remote Sensing and Geographic Information for Decision Support in Lake Manzala, Egypt"*. He addressed the importance of the lake to the Egyptian economy, the main environmental concerns and needs of decision makers that could be answered by the use of remote sensing and GIS. He indicated that the study was based on time series - Landsat Thematic Mapper data, some historical maps and some published monitoring data. The lecturer explained that the area of the lake was shrinking at alarming rates due to human activities. He also demonstrated land-use changes within the areas cut off from the lake.

The presentation also addressed location and rates of coastal erosion along the Mediterranean coast of the lake, impact of Al-Salam canal on the lake shoreline, and a GIS modeling to determine the most polluted basins. The lecturer then gave some recommendations to improve the environmental conditions within the lake.

The second study entitled *"Using GIS for Geo-environmental Assessment in Support of Decision making for Urban Development in the New Minia City, Egypt"*.

Dr. Abdel-Kader first introduced the study area, the main problems facing development, and the information that the study was providing on areas of risks and the suitability and potentialities of the area for urban development. He explained that this information was crucial for decision makers and planners developing the city. He showed some of the GIS data layers used, and maps representing site risk index, urban development suitability and land-use potentialities giving ratings to various areas.

VII. Recommendations

Consequent to discussions and deliberations of the Training Course on the Use of Decision Support Systems for Environmental Management in Coastal and Dry Areas, a consensus was reached, thus formulating specific recommendations that address areas most relevant to the topic of this course.

The participants made the following recommendations:

1- Promote the use of technologies which assist decision makers in improving environmental management, such as the use of environment decision-aiding information tools, through workshops, hands-on training courses, seminars, etc.

2- Strengthening public participation in environmental decision-making through public information systems which enable the flow of information between the government, the public, and the private sector.

3- Promoting complimentary policy instruments/tools and decision support systems that could identify appropriate policy options and alternatives consistent with strategic planning at the local and national levels.

4- Increase awareness among decision-makers to develop an effective DSS to assist in developing proper environmental management plans based on sound decisions, which could create new possibilities to tackle problems of poverty, inequality and severe environmental degradation.

5- ICS/UNIDO in cooperation with CEDARE should endeavour to enhance the existing database on new technologies, that could assist decision makers identify the most appropriate technologies available for industrial pollution prevention.

6- Make an assessment of current coastal decision support systems and disseminate the findings to all concstakeholders for their perusal.

7- CEDARE and ICS-UNIDO to disseminate best practices on the use of DSS in environmental management applications.

8- Make use and generalize the EIADSS software presented in the course for wider use in decision making in various environmental management areas.

VIII. Agenda

TRAINING COURSE ON THE USE OF DECISION SUPPORT SYSTEMS
FOR ENVIRONMENTAL MANAGEMENT IN COASTAL AND DRY AREAS

Damascus, Syria, 20-22 September, 1999

AGENDA

Day One: Monday 20th September 1999

09:00-09:30 Registration
09:30-10:00 Opening, Welcome speeches
10:00-10:30 Coffee break

Session I

10:30-11:00 Overview of ICS-UNIDO
11:00-11:30 Overview of CEDARE.
11:30-13:00 The Coastal Zone ~ An Integrated Approach to Planning for Its Conservation.
Mr. Louis F. Cassar, ICS/UNIDO.

13:00-14:30 Lunch

Session II

14:30-15:00 Decision Support Systems: Concepts and Definitions.
Eng. Ahmed Abdelrehim, CEDARE.
15:00-16:00 Information in Pollution Management and Spatial Decision Support.
Dr. Adel Farid Abdel-Kader, CEDARE.
16:00-16:15 Coffee break.
16:15-17:00 Corporate Data Management for Effective Decision-Making.
Mr. Matthew Gatt, Planning Authority - Malta

Day Two: Tuesday 21st September 1999

Session III

09:00-10:30 Process Simulation.
Eng. Gennaro Longo, ICS/UNIDO.
10:30-10:45 Coffee break
10:45-11:15 DSS for Coastal and Dry Areas-PAP-RAC Experience.
Dr. M. EL Raey, PAP/RAC (Alexandria University).
11:15-12:00 Application of GIS in Coastal Management: Case study of Bahrain
Dr. Asma Abahussain, Arabian Gulf University

12:00-12:45 Use of GIS and Incremental Analysis for Decision-Making in Environmental Ecosystem Restoration Projects.
Dr. Khaled Abu-zeid, Tetra Tech / Infrastructure Southwest Group.
12:45-13:00 Discussion
13:00-14:30 Lunch

Session IV

14:30-15:30 A Decision Support System for Environmental Impact Assessment of Irrigation Projects in Arid and Coastal Areas:
Dr. Khaled Abu-zeid, CEDARE.
15:30-16:00 View on the Status of the Lebanese Experience in Remote Sensing and Decision Support Systems.
Dr. Mohamad Khawle, National Centre for Remote Sensing, Lebanon.
16:00-16:15 Coffee break.
16:15-17:00 Discussion

Day Three: Wednesday 22nd September 1999

Session V

09:00-09:30 The Syrian Experience in Using Decision Support Systems.
Mr. Yehia Awaidah, Ministry of Environment, Syria.
09:30-10:30 Case-study: DSS for Lake Maryut
Eng. Ahmed Abdelrehim, CEDARE.
10:30-10:45 Coffee break
10:45-11:30 Case-study:
Mr. Matthew Gatt, Planning Authority - Malta
11:30-12:15 Integrating Remote Sensing and GIS in Decision Support; Case Studies.
Dr. Adel Farid Abdel-Kader, CEDARE.
12:15-13:00 Recommendations, Adoption of the Report and closing
13:00-14:30 Lunch

IX. List of Participants

Training Course on the Use of Decision Support Systems for Environmental Management in Coastal and Dry Areas
Damascus, Syria, 20-22 September, 1999.

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