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MEDITERRANEAN ACTION PLAN

Presentation Conference on
"MAP in Rhodes: Programme for
Development and Environment"

Rhodes, 14-15 December 1992

Presentation Conference on MAP in Rhodes: Programme for Development and Environment

Minutes of the Conference

UNEP
Athens, 1992

INTRODUCTION

1. As envisaged in the CAMP exercise, a Presentation Conference would be organized for each of the CAMP projects for the purpose of reviewing progress and presenting results of the finished activities to the national authorities. The first such presentation conference was the conference on the Rhodes CAMP project. The Conference was held in the city of Rhodes on 14 and 15 December 1992 under the theme:

"MAP in Rhodes: programme for Development and Environment".

2. The Conference was co-organized by MAP, the Ministry of Environment of Greece, the Prefecture of the Dodecanese and the Municipality of Rhodes in the Grand Hotel Astir Palace in Rhodes.

3. The objective of the Conference was to introduce to the Greek authorities (at national and local levels) the activities, of the Rhodes project, which have been completed or are at an advanced stage of implementation, i.e.:

- Development/Environmental Scenario
- Integrated planning study, Environmental Impact Assessment (EIA) and Carrying Capacity Assessment for Tourism
- Study on implications of expected climatic changes
- Water Resources Master Plan
- Geographical Information System (GIS)

4. All national and local officials and experts, representatives from MAP Regional Centres (RAC), representatives from the EEC, EIB and CEDARE were invited to attend the Conference as well as MAP consultants relevant to the activities presented during the Conference. The List of Participants is attached as Annex I to this report.

5. A provisional Agenda as well as all preparations for the Conference were previously prepared by the meeting of the small Technical Group on the Presentation Conference, which was held in Athens on 20 July 1992 (UNEP(OCA)/MED WG.57). The Agenda is attached as Annex II to this report.

Agenda Item 1 - Opening of the Conference

6. The Conference was opened by Professor S. Busuttil who welcomed the participants to the meeting and expressed his thanks and appreciation to the Greek national and local authorities for hosting the meeting and for all the assistance rendered to the MAP team during the implementation of the Rhodes Project.

7. Mr. Koutroumbis, Special Advisor to the Prefecture of the Dodecanese read a statement on behalf of Ms. Elsa Papadimitriou, Secretary General of the Ministry of the Environment of Greece, who was not able to attend the Conference due to a previous engagement. The text of the statement is contained in Annex III of this report.

8. The Mayor of the City of Rhodes, Mr. Manos Kokkinos, expressed his thanks to UNEP/MAP for the efforts to assist Rhodes through the CAMP project. He pointed out that protection of the environment and development can exist through mutual respect.

9. The meeting also listened to a statement by Mr. Karamarios (Member of Parliament) during which he emphasized that the Island of Rhodes was honored by the presence of UNEP/MAP through the Rhodes project which has particular importance to the Island.

10. Mr. K. Sabet from the Centre for Environment and Development for the Arab Region and Europe (CEDARE) briefed the meeting on his organization, its structure, objective and financial capabilities. He pointed out that as far as the Mediterranean region, CEDARE will operate mainly through MAP, in particular in relation to coastal areas management. Contacts for cooperation on joint programmes have already started with MAP.

11. Mr. G. Clausse, European Investment Bank (EIB), briefed the meeting on the objectives of his institution with regard to the Rhodes project. He informed the meeting that the Bank intends to finance some activities within the project under the METAP Programme.

Agenda Item 2 - Election of officers

12. The Conference elected Mr. Manos Kokkinos, Mayor of the city of Rhodes, as its President, and Mr. Koutroumbis, Special Advisor to the Prefect of the Dodecanese, as Vice-President. Mr. I. Dharat, Senior Programme Officer, MAP, acted as the technical secretary for the Conference.

13. It was agreed that there was no need for a final report of the meeting, but instead brief minutes should be prepared.

Agenda Item 3 - Introductory note by MAP co-ordinator

14. Professor S. Busuttil, MAP Co-ordinator, made a statement on the history, rationale and objectives of the Coastal Areas Management Programme (CAMP) being implemented by MAP, with particular reference to the Rhodes CAMP project. The full text of the statement is attached as Annex IV to this report.

Agenda Item 4 - Presentation of activities and general discussion

15. The following five activities were presented by MAP experts and consultants. A document (UNEP (OCA)/MED WG.60/2) was prepared, containing a summary of the presentation of the five activities:

a) Development/Environment Scenario

Mr. H. Cocossis, Blue Plan Consultant, presented this activity which has a main objective of exploring the future potential impacts of human activities on the national resources and the environment of Rhodes. Five scenarios have been identified to achieve these goals:

- Efficiency scenario, Equity scenario, Conservation scenario, Efficiency-Conservation scenario and Sustainable Development scenario.

The text of Mr. Cocossis presentation is attached as Annex V to this report.

b) Integrated planning study, Environmental Impact Assessment (EIA) and Carrying Capacity Assessment for Tourism

This activity was presented by three experts (Mr. I. Trumbic, Mr. K. Kolligris and Ms. P. Fokiali). Mr. Trumbic, Deputy Director of PAP/RAC tackled three main issues under this presentation:

- MAP and PAP: integrated planning and management (IPM) in the Mediterranean;
- Integrated Planning Study: IPM on the Island of Rhodes;
- Implementation: Tools and techniques for IPM.

A summary of the content of the integrated planning study was given, as well as, an assessment of the work up to the end of 1992.

He pointed out the problems encountered with regard to the institutional structure and the various environmental/development options for the future.

Furthermore, he emphasized on another two aspects of the presentation:

- Environmental Impact Assessment (EIA);
- Carrying Capacity Assessment for Tourism.

The text of Mr. Trumbic's presentation is attached as Annex VI to this report.

Mr. K. Kolligris, Prefecture of the Dodecanese and Ms. P. Fokiali, Ministry of National Economy made brief presentations on the same topics.

c) Study on implications of expected climatic changes

The activity was presented by Mr. C. Perissoratis and Mr. D. Georgas. Mr. Perissoratis, Marine Geologist - IGME (MAP Consultant). The presentation paper was previously issued as document (UNEP (OCA)/MED WG.55/2) for the meeting on implications of climatic changes on the Mediterranean Coastal Areas, held in Malta on 15 - 19 September 1992. A summary of this document was presented during the Rhodes Conference and is attached as Annex VII to this report.

d) Water Resources Master Plan

The activity was presented by Mr. J. Margeta (PAP Consultant). At the beginning of the presentation, he tackled the institutional aspects of the project. The paper was divided into two parts, one on the analysis and presentation of the present water situation in the island and the second on the selection and analysis of solutions related to water resources problems. He pointed out the expected benefits from this exercise which would be:

- harmonic development and protection of the natural resources of the island;
- increased knowledge in the field of water resources management;
- rational management and use of water resources.

The text of Mr. Margeta's presentation is attached as Annex VIII to this report.

e) Geographical Information System (GIS)

The activity was presented by Mr. G. Berlengi (PAP Consultant). He outlined the main contents of the Database for the Island of Rhodes, as well as, the objectives of the GIS Training Programme for the local experts which is designed to improve the quality of information, expand and speed up access to data and information, ensure more efficient information processing and, prepare and produce maps, graphics and technical reports. Furthermore, he informed the participants on the new trends in GIS technology. Finally, the speaker made a few recommendations on the GIS institutionalization and applications. The full text of the presentation is contained in Annex IX to this report.

16. At the end of the various presentations, a general discussion was undertaken. Various pertinent observations and concrete proposals were made from the floor, and questions on several presentations were answered.

17. The general discussion demonstrated the enthusiasm on the part of the local authorities and their readiness to cooperate in the implementation of the project.

18. Greek officials expressed their satisfaction with the involvement of UNEP/MAP in Rhodes and with the level of cooperation through the CAMP Project.

19. A concrete suggestion was proposed and accepted by the participants, that a second presentation conference be organized during the second half of 1993, with a view to presenting the second group of outputs and to review progress achieved.

20. The involvement of the local authorities and people in the Rhodes Project, as well as the strengthening of the institutional structure were strongly stressed.

Agenda Item 5 - Closure of the Conference

21. The Conference was closed by its president on Tuesday, 15 December, 1992, at 12.00 hours.

ANNEX I

List of Participants

Prefecture of Dodekanese

Mr. G. Charalambopoulos
Prefect of Dodekanese

Mr. A. Karamarios
Member of Parliament

Mr. K. Koutroumbis
Special Advisor to the Prefect

Mr. S. Giannikis
Chief of Section

Mr. Ch. Kolligris
Chief of Section

Mr. N. Adamos
Mr. A. Alexiadis
Mr. G. Dellas
Mr. P. Diakogeorgiou
Mr. V. Kiriatsoulis
Mr. J. Kypraios
Mr. G. Kyrimichalis
Mr. E. Nicolaou
Mr. J. Papadopoulos
Ms. M. Patriki-Nicolaou
Mr. V. Sofos
Mr. N. Zarifis

Prefecture of Dodekanese
Eleftherias Square
Rhodes
Greece

Tel. No. 0241-23169, 23270

Municipality of Rhodes

Mr. Manos Kokkinos
Mayor of Rhodes

Mr. Nicos Hatzisavas
Deputy Mayor of Rhodes

Mr. George Skevofeelax
Advisor to the Mayor

Mr. M. Angelidis
Director of Green Service

Mr. A. Hatziioannou
Technical Services

Mr. M. Kaikis
Dept. Forest and Natural Environment

Ms. D. Kourtis-Laoudikos
Water & Sewage Authority

Mr. G. Kostaridis
Water & Sewqage Authority

Ms. K. Tsakiri
Department of International & Public Relations

Municipality of Rhodes
Eleftherias Square
85100 Rhodes
Greece

Tel. No. 0241-28084, 23261
Fax No. 0241 29695

Ministry of National Economy

Ms. P. Fokiali-Tsolakidou
Regional Development Office
Rhodes
Greece

Tel. No. 0241-26182
Fax No. 0241-25852

Ministry of the Environment, Physical Planning and Public Works

Mr. D. Tsotsos
Chemical Engineer-Environmentalist
Ministry of the Environment, Physical Planning
and Public Works
147 Patission Street
112 51 Athens
Greece

Tel. No. 01-8650 334
Fax No. 01-8647 420

Mr. N. Farmakidis
Department of Rhodes

Mr. P. Sirtsacos
Department of Rhodes

Ministry of the Environment, Physical Planning
and Public Works
25th March 30
Rhodes
Greece

Tel. No. 0241-30170

Greek National Tourism Organization

Mr. P. Sirmos
Mr. A. Theofanidis

Greek National Tourism Organization
Makariou and Papagou Street
85100 Rhodes
Greece

Tel. No. 0241-21921, 0241-24445

Central Port Authority of Rhodes

Mr. N. Spanos
Mr. I. Frouzakis

Tel. No. 0241-22220

Institute of Geology and Mineral Exploration (IGME)

Ms. A. Vittoriou-Georgouli
Institute of Geology and Mineral Exploration
70 Messoghion Avenue
Athens
Greece

Tel. No. 01-7798412/7

Other participants from Rhodes

Mr. D. Moschogiannis, President of Employees Centre
Mr. P. Pallas, President of Archipolis Community
Mr. I. Thomaidis
Mr. G. Christodoulou
Mr. J. Iatridis, President of Kalythion Community
Mr. S. Kousournas

Mr. M. Diakomichalis
Mr. Th. Fantidis
Ms. M. Corsini-Foka, Hydrobiological Station of Rhodes
Mr. K. Fotiou, Advisor of Education
Ms. M. Emmanouil
Mr. E. Angelidis, Advisor of Education (environment)
Mr. Th. Anapolitanos, President of the Dodecanesian Committee of the Coalition of the Lest and Progress
Mr. Ph. Kontitsis, Forest Service of Rhodes
Mr. D. Parasos, Architect
Mr. S. Avgoustakis, President of the Architectural Heritage of Rhodes
Mr. E. Papaioannou
Mr. A. Skiadopoulos
Mr. P. Veneris
Mr. I. Thyris

European Investment Bank

Mr. G. Clausse
European Investment Bank
100 Boulevard Konrad Adenauer
2950 Luxembourg - Kirchberg

Tel. No. 4379-2467
Fax No. 437704

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

Mr. K. Sabet
Chief Technical Advisor
CEDARE
21/23 Giza Street
Cairo
Egypt

Tel. No. 570-3473
Fax No. 570-3242

Co-ordinating Unit for the Mediterranean Action Plan (UNEP/MAP)

Professor S. Busuttil, Co-ordinator MAP
Mr. I. Dharat, Senior Programme Officer, MAP

Mr. K. Perissoratis, MAP Consultant (Climatic changes)
Mr. D. Georgas, MAP Consultant (Climatic changes)

48, Vassileos Konstantinou Avenue
Athens 116 35
Greece

Tel. No. 01-7253190
Fax No. 01-7253197

Regional Activity Centres

Priority Actions Programme (PAP/RAC)

Mr. A. Pavasovic, Director, PAP/RAC
Mr. I. Trumbic, Assistant Director PAP/RAC
Mr. J. Margeta, PAP Consultant for water resources action priority, PAP/RAC
Mr. G. Berlengi, PAP Consultant on GIS

Blue Plan (BP/RAC)

Mr. H. Cocossis, BP Consultant for Rhodes scenario

ANNEX II

Provisional Agenda

Monday, 14 December 1992

1. Opening of the Conference
   - H.E. Mr. A. Karamanlis, Minister of the Environment
   - Mr. G. Charalambopoulos, Prefect of Dodekanese
   - Mr. E. Kokkinos, Mayor of Rhodes
   - Prof. Salvino Busuttil, Co-ordinator of the Mediterranean Action Plan (MAP)
2. Election of officers
3. Introductory note by Prof. Salvino Busuttil
4. Presentation of activities:
   a) Development/Environment scenario
   b) Integrated Planning Study, Environmental Impact Assessment (EIA) and Carrying Capacity Assessment for Tourism
   c) Study on Implications of Expected Climatic Changes
   d) Water Resources Master Plan
   e) Geographical Information System (GIS)

Tuesday, 15 December 1992

1. General Discussion on the future of Rhodes
2. Conclusions and Recommendations
3. Closure of the Conference

PRESENTATION

4.a - Development/Environment Scenario

Mr. H. Cocossis, BP Consultant

4.b - Integrated Planning

(1) Integrated Planning Study

Mr. I. Trumbic, Assistant Director PAP/RAC

Mr. K. Kolligris, Prefecture of Dodekanese

(2) Carrying Capacity

Ms. Persa Fokali, Ministry of National Economy

4.c - Climatic Changes

Mr. C. Perissoratis, Marine Geologist, IGME (Institute of Geology and Mineral Exploration), MAP Consultant

Mr. D. Georgas, Marine Geologist, MAP Consultant

4.d - Water Resources

Mr. J. Margeta, PAP Consultant

Ms. Vittoriou, IGME

4.e - Geographical Information System (GIS)

Mr. G. Berlengi, PAP Consultant

Mr. Nikos Zarifis, Office of the Medieval town of Rhodes

ANNEX III

Αθήνα, 10.12.92

Ζητώ συγνώμη για την αδυναμία μου να παραστώ στο συνέδριο που οφείλεται στον ιδιαίτερα αυξημένο φόρτο εργασίας μου αυτή την εποχή.

Το Μεσογειακό Σχέδιο Δράσης του Προγράμματος Περιβάλλοντος των Ηνωμένων Εθνών είναι η σημαντικώτερη οργανωμένη προσπάθεια που γίνεται για την σωτηρία της Μεσογείου, της θάλασσας που ενώνει τους λαούς με την σπουδαιότερη πολιτιστική ιστορία του κόσμου.

Και η προσπάθεια αυτή που ξεκινά από την Αθήνα, το κέντρο της Συντονιστικής Μονάδας του Μεσογειακού Σχεδίου Δράσης, σε συνεργασία με τα διάφορα Περιφερειακά κέντρα της UNEP, αρχίζει πλέον να μορφοποιείται σε συγκεκριμένες δράσεις ύστερα από μακρά περίοδο ανάλυσης και θεωρητικής προσέγγισης των περιβαλλοντικών προβλημάτων των Μεσογειακών Χωρών.

Είμαστε ικανοποιημένοι, γιατί έγκαιρα είχαμε τονίσει στις διάφορες συναντήσεις των εκπροσώπων των Μεσογειακών Χωρών την αναγκαιότητα οργάνωσης τέτοιων δράσεων που θα αντιμετωπίζουν στην πράξη τα σύνθετα προβλήματα προστασίας του Μεσογειακού Περιβάλλοντος. Και είμαστε διπλά ικανοποιημένοι γιατί η Ελλάδα με το πιλοτικό πρόγραμμα της Ρόδου συμμετέχει από την αρχή σε αυτή την φάση ουσιαστικής δραστηριοποίησης του Μεσογειακού Σχεδίου Δράσης.

Γνωρίζουμε όλοι τα προβλήματα υλοποίησης τέτοιων προγραμμάτων όπου εμπλέκονται διεθνείς οργανισμοί, κεντρικές και περιφερειακές υπηρεσίες, Τοπική Αυτοδιοίκηση κλπ. και εργάζονται παράλληλα πολλές τεχνικές ομάδες.

Ιδιαίτερα το ΥΠΕΧΩΔΕ που είναι υπεύθυνο για την εφαρμογή πολλών Κοινοτικών Προγραμμάτων και πολιτικών είναι πολύ φορτωμένο με πολλαπλές δραστηριότητες που συχνά υπερβαίνουν τις δυνατότητες των Υπηρεσιών του, αλλά ταυτόχρονα απαιτούν και άμεση ανταπόκριση.

Πιστεύουμε όμως ότι τέτοια μακροπρόθεσμα προγράμματα, όπως το συγκεκριμένο της Ρόδου, βοηθούν σημαντικά στην προσαρμογή της σκέψης και της δράσης μας σε νέες μεθόδους διαχείρισης περιβαλλοντικών προγραμμάτων, τόσο σε εθνικό όσο και σε περιφερειακό επίπεδο. Παράλληλα η εμπειρία από τις 14 ποικιλόμορφες δραστηριότητες του θα "εξαχθεί" και στις άλλες Μεσογειακές Χώρες για αντιμετώπιση παρόμοιων περιβαλλοντικών συνθηκών και προβλημάτων.

Το Πρόγραμμα Ρόδου, θα αποτελέσει τον πυρήνα ενός πρακτικού "εργαλείου" διαχείρισης του περιβάλλοντος με πρότυπο χαρακτήρα.

Γι' αυτό τον λόγο συμμετέχουμε ενεργά στο πρόγραμμα και το υποστηρίζουμε με την πεποίθηση ότι η επιτυχής ολοκλήρωσή του (καθώς και των άλλων πιλοτικών προγραμμάτων) θα δικαιώσει την πολύχρονη εργασία του Μεσογειακού Σχεδίου Δράσης της UNEP.

Χαιρετίζω λοιπόν το σημερινό συνέδριο που θα παρουσιάσει τα πρώτα αποτελέσματα του προγράμματος και εύχομαι καλή επιτυχία στην συνέχεια ούτως ώστε με την ολοκλήρωση όλων των δραστηριοτήτων να έχουμε όλοι συμβάλει ουσιαστικά στην σωτηρία αυτής της μοναδικής στον κόσμο θάλασσας, της Μεσογείου.

Έβα Παπαδημητρίου
Γενική Γραμματέας
UNEP/MED.

mesogiak

Unofficial translation

ANNEX III

STATEMENT BY THE SECRETARY-GENERAL OF THE MINISTRY OF THE ENVIRONMENT, PHYSICAL PLANNING AND PUBLIC WORKS
Ms. E. Papadimitriou

I would like to apologize that due to workload I was not able to attend this Conference.

The Mediterranean Action Plan of the United Nations Environment Programme is the most "organized" effort that has been made for the salvation of the Mediterranean Sea, a sea which unites the peoples of the most important cultural history in the world.

The Mediterranean Action Plan together with its regional centres has begun to take a shape in particular actions, after a period of analysis of the theoretical approach of the environmental problems of the Mediterranean coastal states.

We are satisfied because we had already pointed out during meetings of the representatives of the Mediterranean countries the necessity of such actions which will face in practical terms the complicated problems of the Mediterranean environment. We are very satisfied because Greece through the Rhodes pilote project is participating from the very beginning in the activities of the Mediterranean Action Plan.

We all know the problems that such programmes are faced with, where international organizations, central and regional offices, central government etc and many technical groups are involved.

In particular the Ministry of the Environment is responsible for the application of many EC programmes and policies and many times all these programmes go beyond its potential, but at the same time require immediate action.

We believe that such medium-term programmes like the one in Rhodes, help substantially the re-orientation of our thougts and actions towards new ways and methods of handling environmental programmes at national and regional level. At the same time the experience gained from the Rhodes project could be "exported" to other countries that face similar problems.

The Rhodes programme will constitute the nucleus of a practical "tool" for managing the environment with a prototype character.

For this reason we are actively participating in the programme and we are supporting it with the belief that its completion (as well as other pilote programmes) will justify the long work of the Mediterranean Action Plan of UNEP.

I greet today's conference where the first results of the programme will be presented and I wish every success. With the completion of its activities we will all have contributed to the salvation of this unique sea which is called Mediterranean.

ANNEX IV

Statement by Professor S. Busuttil
at the Presentation Conference

Rhodes, 14 December, 1992

HISTORY, RATIONALE AND OBJECTIVES OF THE COASTAL AREAS MANAGEMENT PROGRAMME

During the first decade of the Mediterranean Action Plan (MAP), it was recognized that the bulk of MAP's activity has been focused on the monitoring of the state of the Sea and interventions aimed at improving the state of the natural system. The emerging understanding that the sources of pollution problems are mostly (80%) land-based and the necessity for the harmonization of regional and global development with the receptive capacity of the environment, which calls for a permanent process of integrated planning, as well as for a rational management of the limited resources available in the region, has led to the refocusing of MAP on activities carried out in coastal zones.

Keeping all these factors in mind, the Executive Director of UNEP presented to the Fifth Ordinary Meeting of the Contracting Parties to the Barcelona Convention (Athens, 7-11 September 1987) a document on "Policy recommendations of the Executive Director explaining the new global orientation of the Mediterranean Action Plan (MAP) which has geared its activities towards the development of environmentally sound integrated management of the Mediterranean coast through, among others, the process of integrated planning. This orientation implies a harmonized involvement of all MAP components as well as relevant international bodies, for a better utilization of the limited resources of the Mediterranean region in the interest of the countries of the region and of their development, while being in accordance with sound long-term environmental management rules.

Moreover, the needs of the present, without compromising the ability of future generations to meet their own needs, i.e., sustainable development, was an essential factor when undertaking the process of integrated planning of the development and management of the resources of the Mediterranean Basin.

Based on the preliminary work of the Priority Actions Programme/Regional Activity Centre (PAP/RAC) during the 1988-1989 biennium on the four country pilot projects (CPP), namely The Kastela Bay, the Izmir Bay, the Island of Rhodes and the Coast of Syria, the Sixth Ordinary Meeting of the Contracting Parties (October 1989) decided to continue work on the four on-going MAP pilot projects and renamed the programme as **Coastal Areas Management Programme (CAMP).**

Moreover, the meeting decided:

- to assist Mediterranean States to identify and formulate environmental protection and integrated development projects in coastal zones and to make use of significant national and international financing;

- that attention will be focused on projects that are the most viable from the point of view of the Mediterranean environment and financing organizations;

- that up to ten projects could be studied, to deal simultaneously with up to three programmes in the preliminary phase and four in the executive phase, unless appropriate external support would be found for specific programmes;

- to prepare detailed proposals for new programmes including obligations of each participating party, signed by competent national authorities. Such proposals would evaluated by the secretariat and presented to the Contracting Parties for adoption;

- to secure participation of UNEP and other UN bodies dealing with industrial, toxic and hazardous wastes;

- to invite UNEP and the other international organizations (e.g. the World Bank) to provide financial support to cooperative and pilot projects;

- to invite the national authorities concerned and the relevant bilateral and multilateral programmes to support the four on-going pilot projects as practical demonstration areas for the protection of the Mediterranean.

In carrying out the CAMP programme, the role of MAP and its various components (MED POL, REMPEC, PAP, BP, SPA and Historic Sites) is primarily catalytic. While keeping in mind that their financial resources are limited and hardly sufficient for an all-inclusive inauguration of the process of integrated planning and management of resources in the Mediterranean coastal areas, it should be emphasized that this programme is still capable of assisting in the creation of a solid basis for further larger intervention.

As the activities of MAP and its various components cover a whole range of diverse development-versus-environment problems which may appear in a selected CAMP programme, the experience gained during the last decade by MAP and its various components will ensure a substantive contribution to this exercise.

This catalytic role of MAP has an objective of:

a. galvanizing interest of local as well as national authorities, institutions and experts in co-operation;

b. transfer of international knowledge and technologies;

c. procuring necessary support for expertise, training and minimum equipments especially for the southern countries of the Mediterranean;

d. introducing techniques and tools for environmentally sound management;

e. co-operating with international funding institutions;

f. accentuating problems of a selected area by placing them in a wider national, regional and international context;

g. developing legislative instruments and administrative structure;

h. promoting environmental awareness in the Mediterranean region;

With its limited financial and institutional capabilities, it is understandable that a programme such as MAP per se cannot meet such an ambitious goal. That is why co-operation with local authorities, experts and general public of the Mediterranean region, as well as with international financing institutions becomes an imperative tool for the success of this re-orientation of MAP, of which the Coastal Areas Management Programme (CAMP) was indeed an efficient form of establishment of this kind of co-operation.

In conformity with the decisions of the Contracting Parties to formalize the CAMP exercise, four agreements concerning the four CAMP projects were signed by UNEP/MAP and the respective governments and were distributed to all MAP focal points for information:

- The Agreement concerning the Syrian Coast (Syria) was signed on 18 June 1990;

- The Agreement concerning the Bay of Izmir (Turkey) was signed on 20 June 1990;

- The Agreement concerning the Island of Rhodes (Greece) was signed on 12 December 1990;

- The Agreement concerning the Bay of Kastela (Yugoslavia) was signed on 24 December 1990.

In the whole framework of the CAMP, it has become evident that the methodology used for the Mediterranean scenarios was not fully suitable for scenarios making on small geographical areas. So during the biennium 91/92 and in consultations with many Mediterranean experts, Blue Plan developed a more appropriate methodological approach in the form of the adaptation of prospective approach and systemic analysis for small coastal areas, based on the Blue Plan experience, in particular, after the finalization of the third phase of the Blue Plan exercise by issuing the report on the Futures of Mediterranean Basin. The prospective and systemic analysis, methods and tools were intended to assist local authorities in:

- analysis of the development/environment relationships;
- identification of key actors/decision-makers, actual and potential, nature of effective relations and competence;
- identification of conflictual zones, mainly of resource use, and breaking points;
- identification of key indicators that will enable defining sectorial/regional/national evolution and future trends;
- definition of development/environment scenarios.

The usefulness of such an exercise is to enable, and then make the decision-makers get used to:

. think in a systemic way;
. consider and analyse the key actors strategies;
. identify foreseeable obstacles/dangers for a sustainable development;
. draw down long term trend evolutions; and
. elaborate future images/scenarios that ought to become the strategic framework, reviewable, for planning.

In recognizing the importance of the CAMP exercise in developing the Mediterranean coast in a manner that takes into due consideration the environmental factor, the Seventh Ordinary Meeting of the Contracting Parties (Cairo, 8-11 October 1991) decided:

a. to continue work on the four on-going Coastal Areas Management Programmes (Bay of Kastela, Bay of Izmir, Island of Rhodes and the Cost of Syria);

b. to approve two more Coastal Areas Management Programmes (Fuka-Matrouh, Egypt and Sfax, Tunisia);

c. to start preparation for three new projects (Albania, Algeria and Morocco);

d. to invite the national authorities concerned and the relevant bilateral and multilateral programmes to support the above Coastal Areas Management Programme as practical demonstration areas for the protection of the Mediterranean;

e. to organize consultation meetings relevant to the Coastal Areas Management Programme for the areas mentioned above and take all appropriate measures for the implementation of such projects.

COASTAL AREA MANAGEMENT PROGRAMME FOR THE ISLAND OF RHODES

In expressing its commitment to the philosophy of the reorientation of MAP towards integrated planning and management of the coastal areas, the Greek Government nominated the Island of Rhodes, as one of the first Coastal Areas Management Programme exercises (CAMP).

An agreement was signed between the Greek Government and the United Nations Environment Programme relative to the Coastal Area Management Programme for the Island of Rhodes in November 1990).The objectives of the programme were 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 measure with a view to resolving the existing environmental conflicts and setting up the optimum paths of the future dynamic development;

- propose a development concept of the coastal area, harmonized with the receiving capacity of the environment and to create conditions for the establishment of the system of integrated planning and management of resources in the area;

- The immediate objective of the programme is to give, within the individual actions, solutions to environmental problems of the most urgent nature which could be implemented immediately.

The purpose of the present conference is to present to the Greek authorities the activities embodied in the project which have been completed or in an advanced stage of implementation with a view to stimulating thoughts and ideas in regard to the follow-up process.

The following activities will be presented during the conference:

- Development/Environment Scenarios, with the objective to explore the future potential impacts of human activities on the natural resources and the environment of Rhodes;

- Integrated Planning Study, Environmental Impact Assessment and Carrying Capacity Assessment for Tourism with one of the principal objectives being the integration of environmental aspects of development into the earliest phases of the planning process, as well as to secure that all planning actions are verified through the assessment of their possible impacts on the environment.

- Implications of Expected Climatic Changes with the objective to identify and access the eventual implications of the expected climatic changes on the various physical aspects of Rhodes, to determine the most vulnerable areas and ecosystems and to suggest policies and measures in order to avoid the negative effects of climate change;

- A Water Resources Master Plan with the objective to protect the water resources of the Island of Rhodes and to provide increased knowledge on the water resources management.

- The Geographical Information System with the objective to provide a basis for regional level Geographical Information System applications in supporting a part of planners' activities within the context of the Integrated Planning Study preparation.

ANNEX V

COASTAL AREA MANAGEMENT PROGRAMME FOR THE ISLAND OF RHODES, GREECE

Government of Greece,
Ministry of the Environment, Physical Planning & Publics Works.

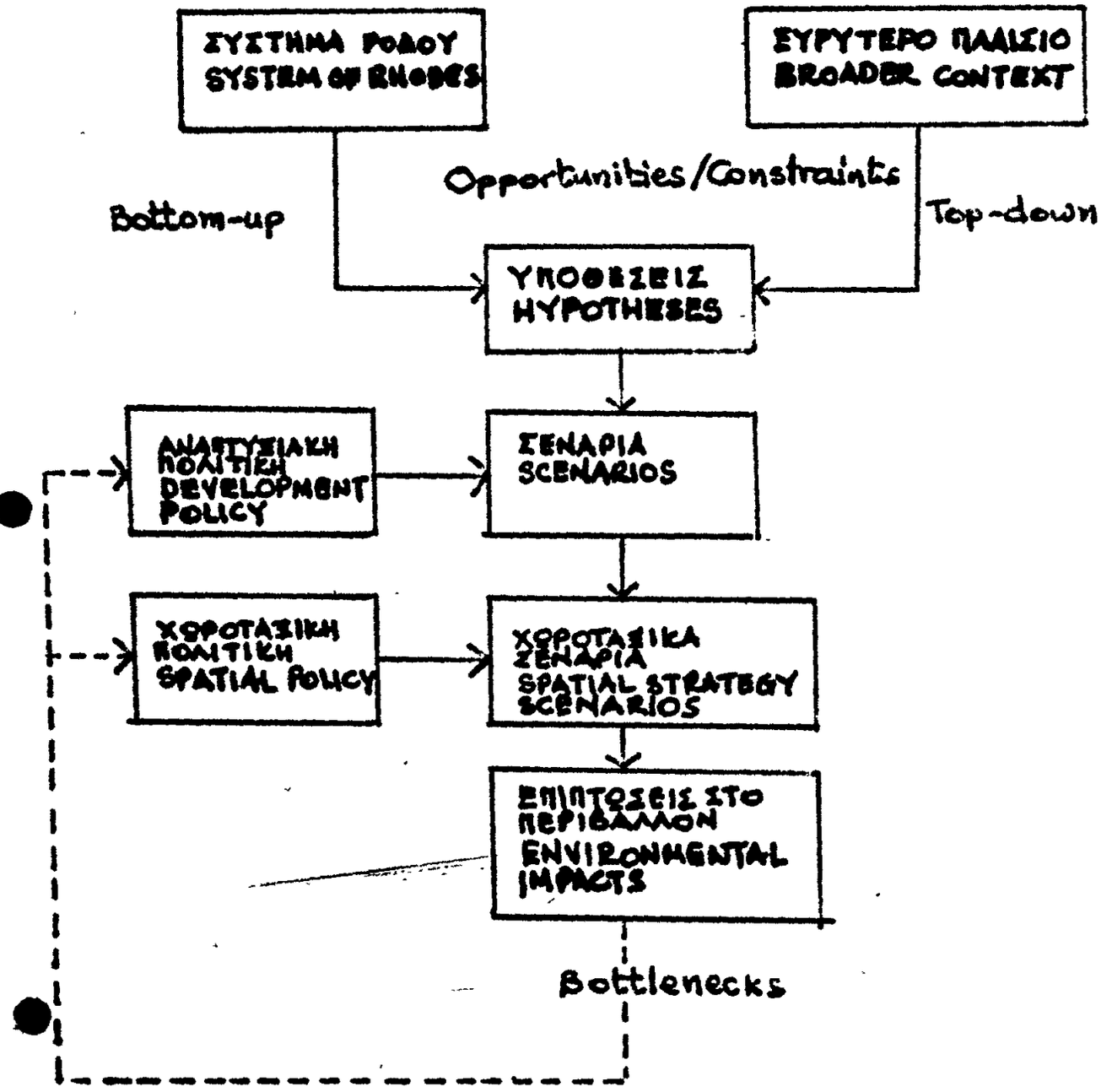
United Nations Environment Programme
Mediterranean Action Plan
Blue Plan / Regional Activity Center

DEVELOPMENT - ENVIRONMENT SCENARIOS FOR RHODES

UNIVERSITY OF THE AEGEAN

DEPARTMENT OF ENVIRONMENTAL STUDIES

Athens, December 1992


ΣΥΣΤΗΜΑ ΡΟΔΟΥ
SYSTEM OF RHODES
ΕΥΡΥΤΕΡΟ ΠΛΑΙΣΙΟ
BROADER CONTEXT
Opportunities/Constraints
Bottom-up
Top-down
ΥΠΟΘΕΣΕΙΣ
HYPOTHESES
ΑΝΑΠΤΥΞΙΑΚΗ ΠΟΛΙΤΙΚΗ
DEVELOPMENT POLICY
ΣΕΝΑΡΙΑ
SCENARIOS
ΧΩΡΟΤΑΞΙΚΗ ΠΟΛΙΤΙΚΗ
SPATIAL POLICY
ΧΩΡΟΤΑΞΙΚΑ ΣΕΝΑΡΙΑ
SPATIAL STRATEGY SCENARIOS
ΕΠΙΠΤΩΣΕΙΣ ΣΤΟ ΠΕΡΙΒΑΛΛΟΝ
ENVIRONMENTAL IMPACTS
Bottlenecks

LISTE DES VARIABLES D'ETAT

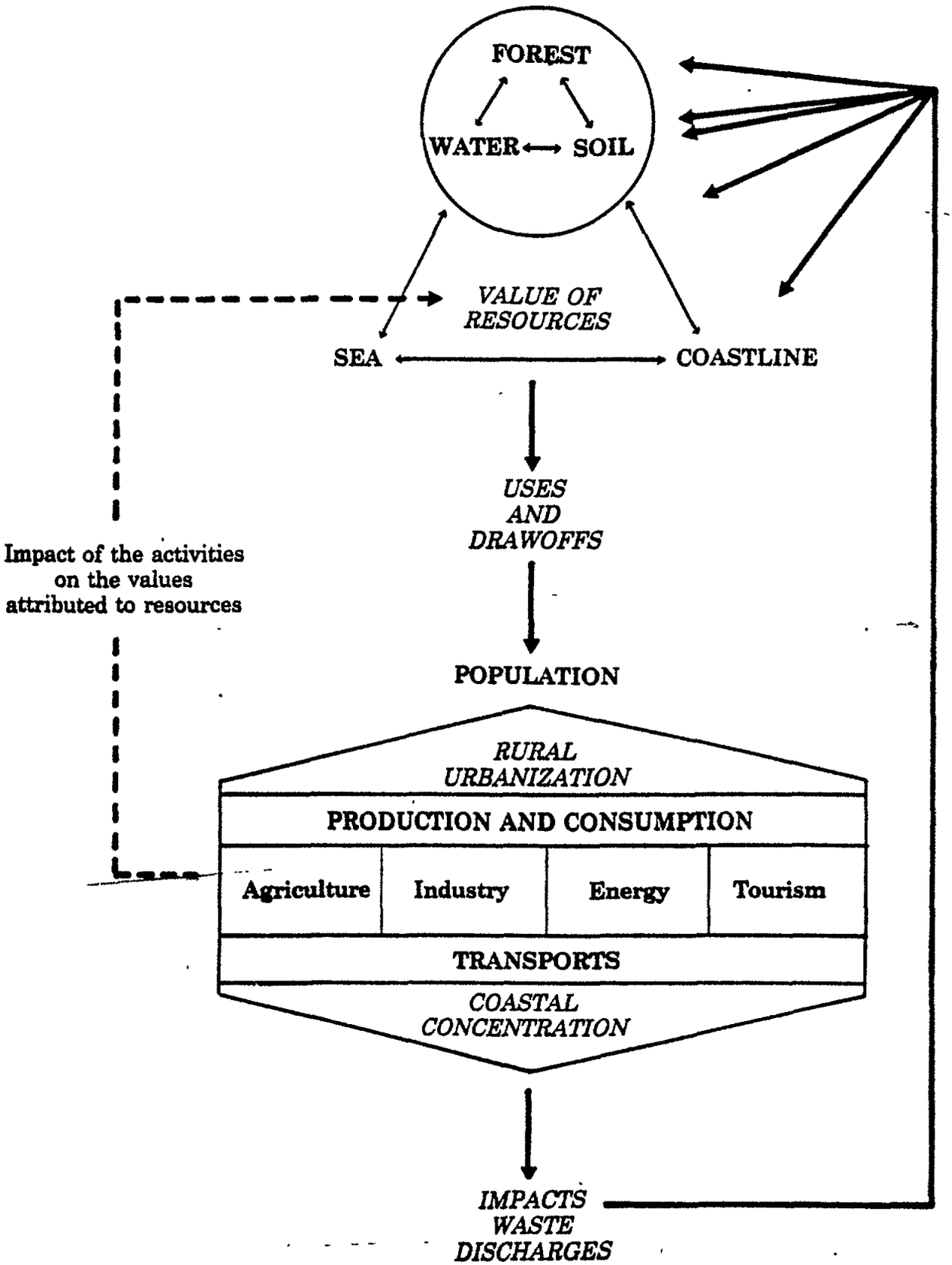
VARIABLES INTERNES

1 climat et météorologie
2 ressources en eau exploitables
3 relief-géomorphologie-paysage
4 végétation, faune et flore
5 côtes, interface terre/mer
6 population permanente (nombre)
7 immigration (nombre)
8 foyers mixtes (nombre)
9 valeurs: profit court terme, travail mi-temps
10 enseignement-formation (offre)
11 structure de la propriété foncière
12 législation, droit, réglements de la propriété foncière
13 pollutions et nuisances
14 infrastructures de santé et d'hygiène
15 patrimoine architectural
16 ville médiévale-site historique et humain
17 différentiel PIB
18 primes et subventions
19 BTP (local et national)
20 productions agricoles
21 productions artisanales
22 productions industrielles et énergie
23 commerces (nombre et superficie)
24 importations (valeur)
25 emplois (nombre)
26 qualification de la main d'œuvre
27 investissements locaux privés
28 flux de devises
29 taux de change
30 nombre de touristes
31 activités des touristes
32 activités des tours opérateurs
33 hébergement et restauration touristiques
34 qualité/prix des services touristiques
35 financement des projets locaux par l'état grec
36 activités des élus locaux
37 activités de la préfecture
38 zone saturée
39 zones protégées (forêts, sites archéologiques)
40 zone non contrôlée
41 zone controle qualitatif
42 liaisons terrestres
43 liaisons aériennes
44 liaisons maritimes
45 attractivité du pôle de la ville de rhodes

VARIABLES EXTERNES

46 conjoncture tourisme international
47 internationalisation culturelle (niveau global
48 situation géopolitique
49 aides CEE
50 politique de l'Etat grec

liste révisée par E. C., J.P.G., P.F.G., réunion du 10-10-91



(Source : Blue Plan)

DIAGRAM OF RELATIONSHIPS BETWEEN ENVIRONMENTAL COMPONENTS AND DEVELOPMENT ACTIVITIES

ΑΝΑΠΤΥΞΙΑΚΑ/ΠΕΡΙΒΑΛΛΟΝΤΙΚΑ ΣΕΝΑΡΙΑ ΓΙΑ ΤΗ ΡΟΔΟ
DEVELOPMENT/ENVIRONMENT SCENARIOS FOR RHODES

- **Σενάρια;** - Scenarios?

- **Στόχοι** - Goals

  - **Διερεύνηση εναλλακτικών αναπτυξιακών στρατηγικών**
    Exploration of alternative development strategies

  - **Ανάλυση επιπτώσεων στο περιβάλλον**
    Anticipation of impacts on the environment

  - **Προσδιορισμός συγκρούσεων και αναζήτηση δράσεων**
    Conflict identification and course of action exploration

- **Μεθοδολογική προσέγγιση** - Method of approach

  - **Συστημική προσέγγιση**
    Systems approach

  - **Μέθοδος** - Method

    - **Ανάλυση δομής και δυναμικής**
      Analysis of structure and dynamics

    - **Υποθέσεις** - Hypotheses

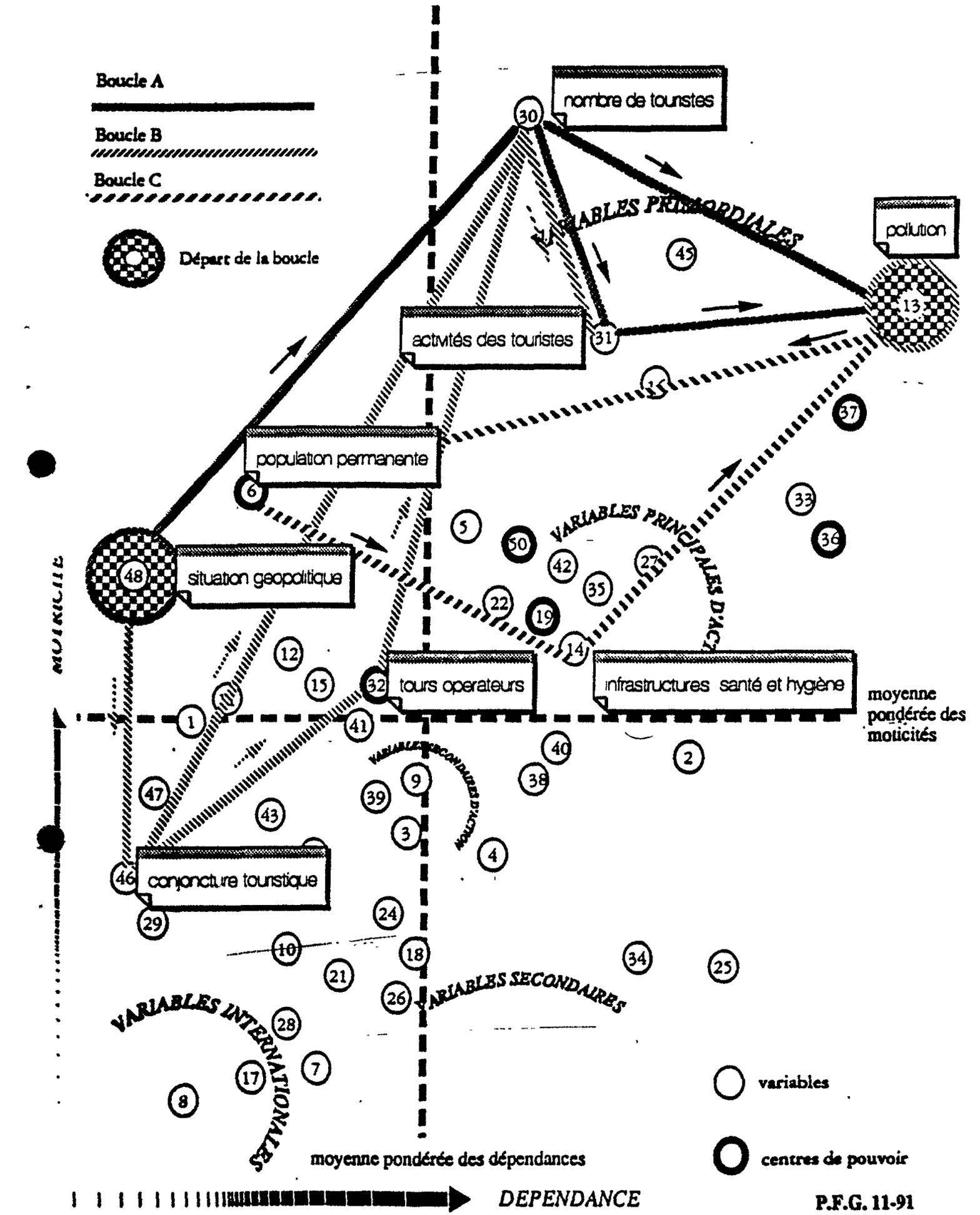
    - **Σενάρια** - Scenarios

    - **Χωροταξικές στρατηγικές** - Spatial Strategies

    - **Επιπτώσεις στο περιβάλλον** - Environmental Impacts

    - **Θέματα πολιτικής για το μέλλον** - Future policy issues

BOUCLES DE CAUSALITE (exemples)



BLUE PLAN DEVELOPMENT/ENVIRONMENT SCENARIOS FOR RHODES

FORMULATION OF ALTERNATIVE SCENARIOS

- TOP-DOWN APPROACH
  - International context

    Geo-political considerations

    Macrosocioeconomic considerations

    Tourism

    National economic growth
  - National context

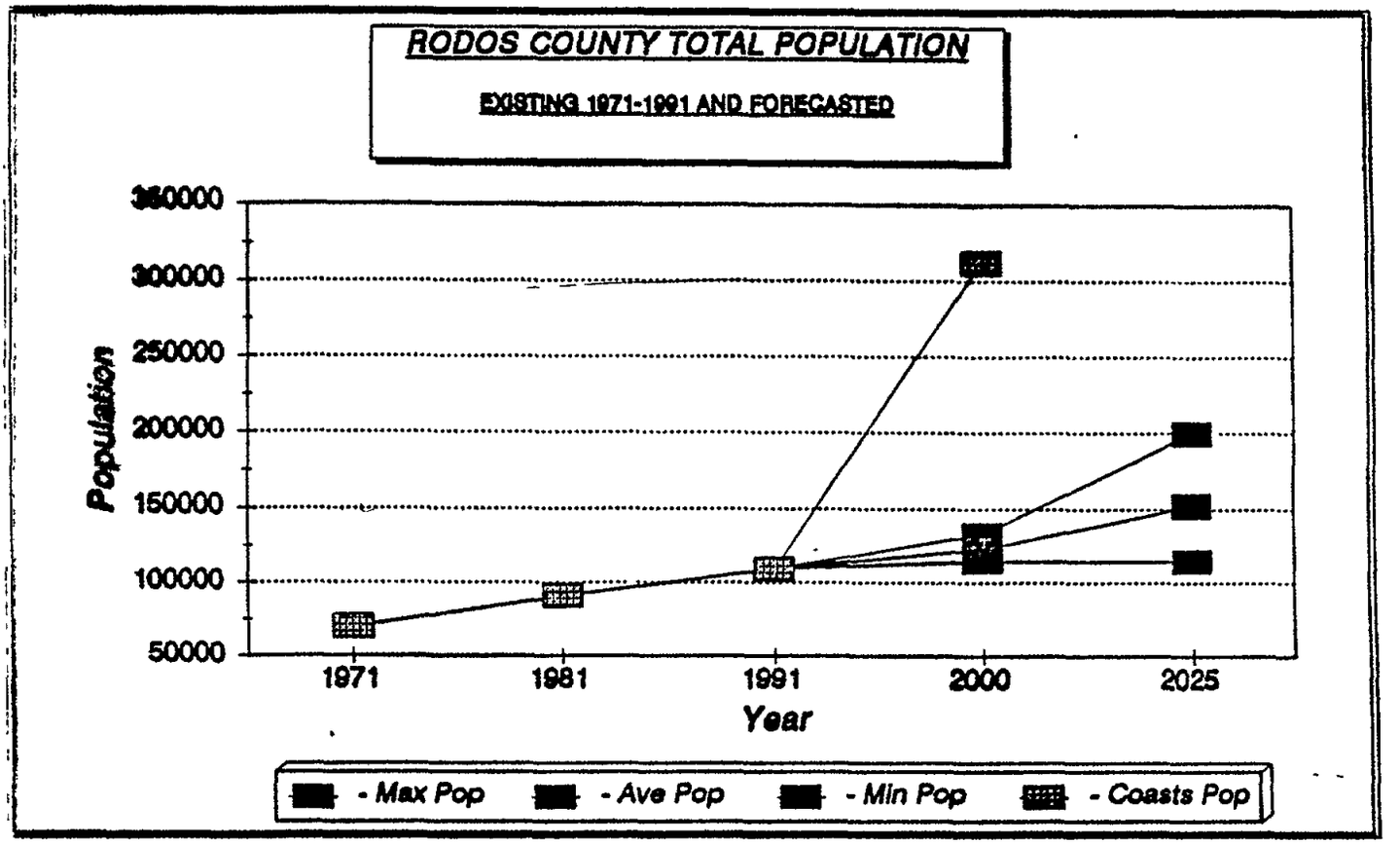
    National policy context

    Regional policy context
  - Regional/local context

- BOTTOM-UP APPROACH
  - Resource considerations

    Capacity/supply constraints
  - Infrastructure considerations

    Capacity constraints
  - Local policy context



Forecast	Population			Annual Rate	
	1991	2000	2025	1991-2000	2000-2025
Minimum	109.500	114.900	114.900	0.53%	0.00%
Average	109.500	123.200	199.700	1.31%	0.98%
Maximum	109.500	132.700	152.100	2.16%	2.06%
Constraint	-	312.200	312.200	-	-

1. Distribution of Total Population

1.a. Maximum Total Population:

1991-2000: 132.721
1991-2025: 199.728

	Forecast 1		Forecast 2		Forecast 3		Forecast 4		Forecast 5		Forecast 6		Forecast 7	
	2000	2025	2000	2025	2000	2025	2000	2025	2000	2025	2000	2025	2000	2025
	132.721	199.728	132.721	199.728	132.721	199.728	132.721	199.728	132.721	199.728	132.721	199.728	132.721	199.728
1	82.306	129.819	82.278	128.984	81.814	123.120	71.016	81.119	71.999	84.943	88.816	150.353	73.557	91.004
2	16.690	23.251	16.699	23.299	16.832	25.330	18.259	30.880	20.714	40.428	14.696	17.022	15.715	20.9[illegible]
3	7.778	12.127	7.869	13.626	7.742	11.650	7.855	12.090	8.069	12.924	6.719	7.673	8.033	12.7[illegible]
4	4.838	6.016	4.839	6.017	4.954	7.455	6.907	15.053	7.794	18.501	4.088	4.088	5.116	8.00[illegible]
5	11.819	16.461	11.825	16.497	11.920	17.938	13.613	24.523	13.714	24.915	10.384	11.962	13.332	23.429
6	5.542	7.462	5.516	7.146	5.614	8.448	11.513	31.395	7.144	14.400	4.675	4.797	13.471	39.011
r	3.747	4.592	3.695	4.159	3.845	5.787	3.558	4.668	3.287	3.617	3.343	3.832	3.496	4.427

1.b. Average Total Population:

1991-2000: 123.221
1991-2025: 152.075

	Forecast 1		Forecast 2		Forecast 3		Forecast 4		Forecast 5		Forecast 6		Forecast 7	
	2000	2025	2000	2025	2000	2025	2000	2025	2000	2025	2000	2025	2000	2025
	123.221	152.075	123.221	152.075	123.221	152.075	123.221	152.075	123.221	152.075	123.221	152.075	123.221	152.075
1	76.248	96.904	76.232	96.510	75.958	93.745	69.584	73.934	70.164	75.738	80.091	106.590	71.084	78.597
2	15.544	18.306	15.549	18.329	15.627	19.287	16.470	21.904	17.919	26.408	14.366	15.368	14.968	17.238
3	7.209	9.095	7.263	9.803	7.188	8.871	7.254	9.078	7.381	9.471	6.584	6.995	7.360	9.406
4	4.531	4.997	4.532	4.998	4.599	5.676	5.752	9.260	6.276	10.887	4.088	4.088	4.695	5.974
5	11.007	12.961	11.011	12.979	11.067	13.658	12.066	16.764	12.126	16.949	10.160	10.839	11.900	16.248
6	5.170	5.967	5.154	5.818	5.212	6.432	8.694	17.256	6.115	9.240	4.658	4.710	9.850	20.848
r	3.512	3.843	3.481	3.638	3.570	4.406	3.400	3.878	3.241	3.382	3.273	3.484	3.364	3.765

III.c. Minimum Total Population:

1991-2000: 114.892

1991-2025: 114.892

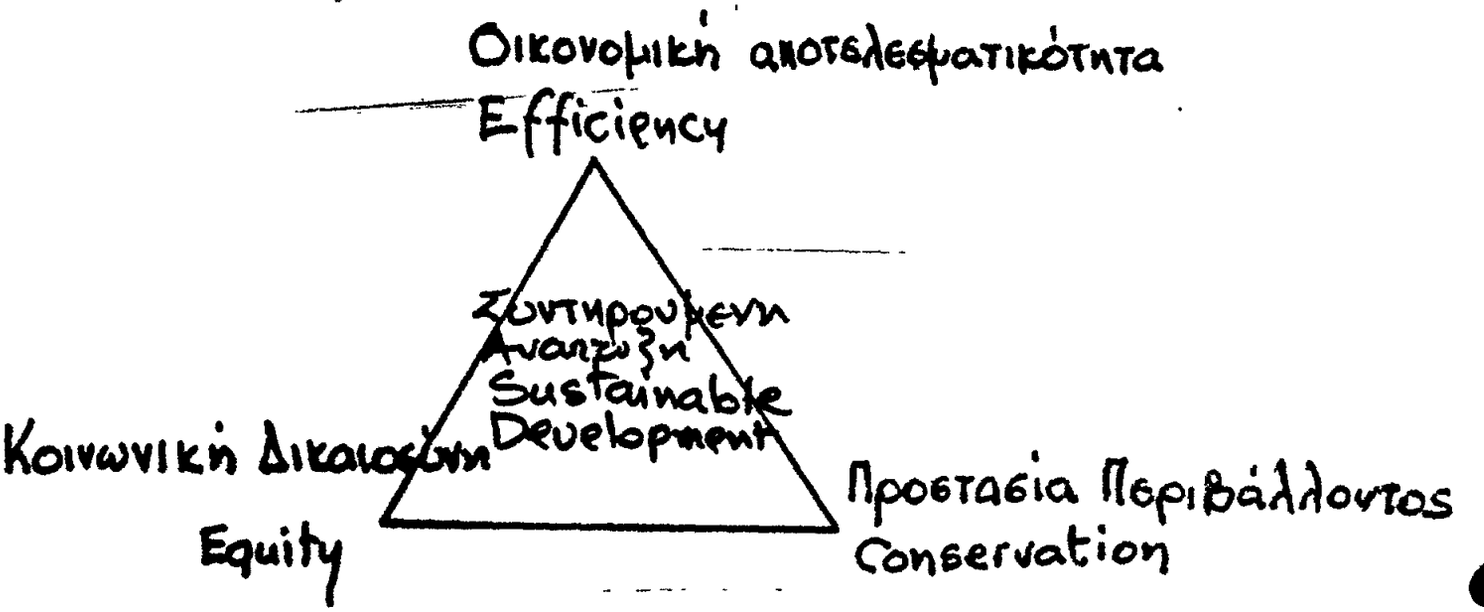
	Forecast 1		Forecast 2		Forecast 3		Forecast 4		Forecast 5		Forecast 6		Forecast 7	
	2000	2025	2000	2025	2000	2025	2000	2025	2000	2025	2000	2025	2000	2025
	114.892	114.892	114.892	114.892	114.892	114.892	114.892	114.892	114.892	114.892	114.892	114.892	114.892	114.892
1	70.837	71.222	70.931	71.172	70.824	70.824	68.328	68.328	68.555	68.555	72.442	72.442	68.915	68.915
2	14.538	14.447	14.540	14.450	14.571	14.571	14.901	14.901	15.468	15.468	14.077	14.077	14.313	14.313
3	6.710	6.730	6.731	6.819	6.702	6.702	6.728	6.728	6.777	6.777	6.465	6.465	6.769	6.769
4	4.262	4.203	4.262	4.203	4.288	4.288	4.740	4.740	4.945	4.945	4.088	4.088	4.326	4.326
5	10.295	10.231	10.297	10.233	10.319	10.319	10.710	10.710	10.733	10.733	9.964	9.964	10.645	10.645
6	4.843	4.801	4.837	4.782	4.860	4.860	6.223	6.223	5.213	5.213	4.643	4.643	6.676	6.676
	3.306	3.258	3.294	3.232	3.329	3.329	3.262	3.262	3.200	3.200	3.213	3.213	3.248	3.248

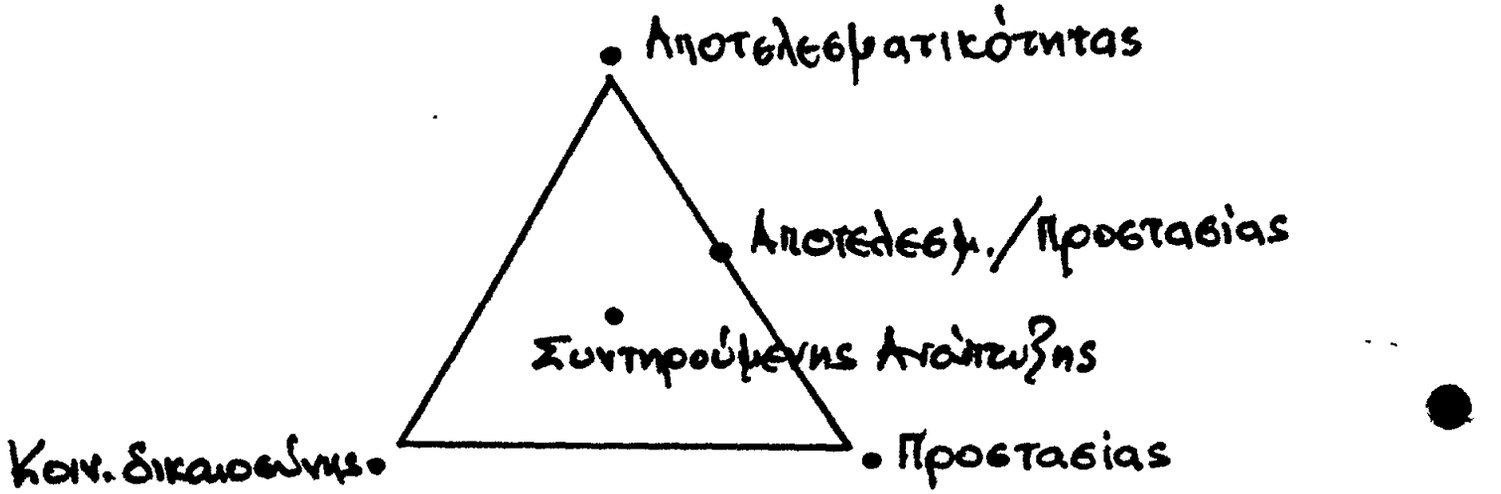
III.d. Population based on Maximum Exploitation of Tourism Potential (Beaches)

1991-2000: 312.203

	Forecasts 2000						
	1	2	3	4	5	6	7
	312.203	312.203	312.203	312.203	312.203	312.203	312.203
1	196.750	196.504	192.454	98.079	106.671	253.648	120.290
2	38.356	38.430	39.595	52.064	73.519	20.927	29.835
3	18.530	19.321	18.211	19.199	21.073	9.275	20.761
4	10.639	10.651	11.653	28.726	36.475	4.088	13.070
5	27.159	27.213	28.040	42.836	43.717	14.611	40.377
6	12.582	12.350	13.205	64.767	26.579	5.002	81.880
	8.187	7.734	9.045	6.532	4.169	4.652	5.990

3 ΓΕΝΙΚΟΙ ΣΤΟΧΟΙ
GOALS





5 ΣΕΝΑΡΙΑ
SCENARIOS

	Concentrated	Linear	Multi - nodal
EFFICIENCY	●	●	
EQUITY		●	
CONSERVATION			●
EFFICIENCY - CONSERVATION			●
SUSTAINABLE			●

	EFFICIENCY Concent.	EFFICIENCY Linear	EQUITY	CONSERVATION	EFFIC.- CONSER.	SUSTAINABLE
Rodos	40%	10%	10%		10%	10%
Lindos	40%	10%	10%		30%	30%
Katavia					20%	20%
Embonas					20%	20%
Rest	20%	80%	80%		20%	20%

	YEAR	EFFICIENCY concentrated	EFFICIENCY linear	EQUITY	EFF.-CONSER.	SUSTAINABLE	CONSERVATION
CURRENT n. of BEDS		60000	60000	60000	60000	60000	60000
m2 / BED		20	25	10	25	15	20
FLOOR AREA RATIO		1	0.6	0.062	0.4	0.3	0.2
INFRASTRUCTURE		1.1	1.3	1.3	1.2	1.2	1.2
ADDITIONAL n. of BEDS	2000	37000	37000	10000	20000	10000	1000
	2025	*113000*	*113000*	*90000*	*90000*	*90000*	*27000*
URBAN LAND DEMANDED	2000	814000	2004167	2096774	1500000	600000	120000
	2025	*2486000*	*6120833*	*18870968*	*6750000*	*5400000*	*3240000*

■ Χωροταξικές στρατηγικές - Spatial Strategies

Spatial hypotheses.

1. the city of Rhodes becomes the main pole of tourism development.
2. development of a two-pole tourism system : city of Rhodes -Lindos.
3. linear development along the coastline.
4. a more balanced development with more than two, tourist poles.

Reasons for the selection of the above strategies.

They reflect current trends.

The poles of Rhodes and of Lindos, will increase in the future their share in the tourist market, capitalizing on existing infrastructure and facilities

Trend for tourist development along the coastline.

The creation of a balanced spatial strategy, includes two more poles in the southern and western part of the island.

COMPARATIVE ANALYSIS:

Equity and Preservation scenarios rather undesirable options either because of the environmental impacts, or because of the no - growth character

efficiency scenario :

- strong internal competition, not necessarily for the benefit of locals,
- the banalization of landscape,
- the suppression of other activities,
- less opportunities, for an equitable distribution
- the spoiling of the environment, which will either cause the disaffection of tourists, or the loss of the island's bargaining power,

efficiency-conservation scenario:

- better inter-sectoral linkages,
- a more balanced structure of the economy,
- a dynamic agriculture sector, specialized products,
- the image of Rhodes is enriched, as place of origin for certain products (wine),
- quality in the production of handicrafts,
- preservation of the built heritage,
- tourism benefits from the preservation of historically traditional activities,
- smaller units, quality of services,
- upgrading of existing facilities,
- sustain, enrich the image of the island,
- reject exploitation, ensure rational management,

efficiency conservation scenario:

- provoke conflicts concerning land uses,
- demand sophisticated management, probably ignoring local human resources.
- demand the application of high technology, of scientific methods, of experts.

sustainable development scenario:

- amelioration of services, provided to the local community, health provision, education, amenities,
- enabling community to care for it's own environment, through promotion of public awareness, education,
- increase opportunities for economic and managerial participation,
- Rhodes development, into an important pole of the south region, with not only economic significance,
- the application of low cost, and friendly to the environment, technology, using and improving traditional techniques, that have prove to be efficient, and could be applied by local people,
- the economic value of the natural resources reflect not only the cost, due to their potential use, but also an existing value due to their no-use.

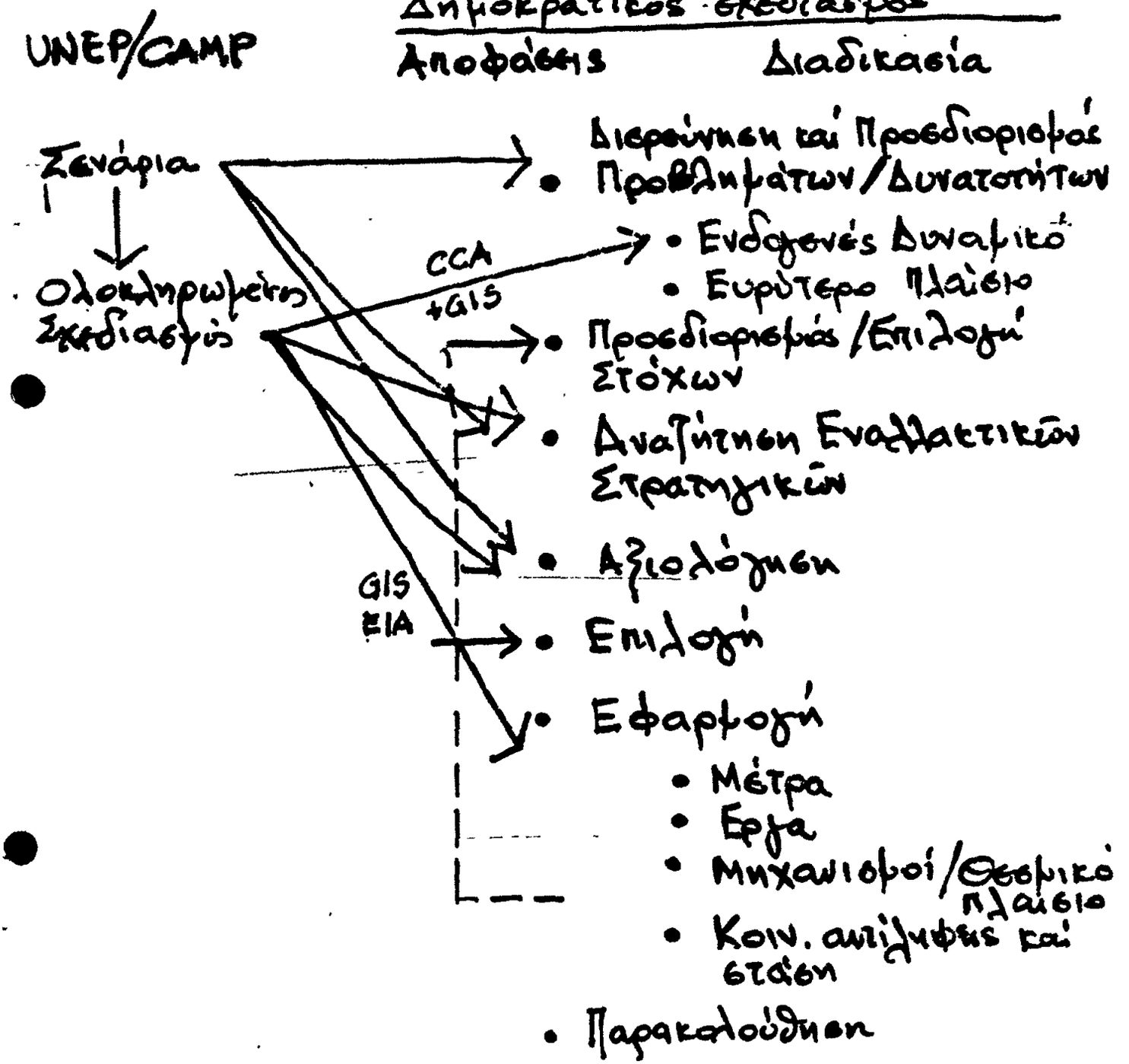
SCENARIOS	PRIVATE INVESTMENTS	PUBLIC INVESTMENTS FOR INFRASTRUCTURE	INVESTMENTS FOR ENVIRONMENTAL PROTECTION	LABOR / IMMIGRATION	BALANCE OF THE SECTORAL MIX	INSTITUTIONAL FRAMEWORK	PLANNING / LAND USE CONTROL	MANAGEMENT OF RESOURCES	EDUCATION / SKILLS	ATTITUDES	LAND	WATER	TYPE OF TOURIST SERVICES
EFecon.	high	moderate	moderate	high	moderate	strong	strong	none	demand for skillfull labour	exploitation ensuring quality of environmental tourist products	low	high	mass quality services
EFfin.	high	high	high	high	moderate	weak	none	none	"	maximum exploitation	moderate	high	"
EQUITY	low	high	high	moderate	low	weak/ environmental	none	none	low	sort term exploitation	high	moderate	low quality of services
CONSERVATION	none	low (upgrading)	moderate (no growth)	current status	moderate	strong	strong	high	high	conservation	low	low	encourage selective type of tourism, ecotourism
EFF.-CONS.	moderate	moderate	high/high technology	moderate	moderate	strong	strong	high	demand for experts, sophisticated management	economic approach of the environmental quality	moderate	moderate	north: mass quality south selective / luxury
SUSTAINABLE	moderate	moderate	moderate/low cost techn	moderate	high	strong	strong	high	enable to care for its own environment	new ethic !	moderate	moderate	quality/differenciation of tourist product

ΣΧΕΔΙΑΣΜΟΣ - ΠΡΟΓΡΑΜΜΑΤΙΣΜΟΣ
PLANNING

UNEP/CAMP

Δημοκρατικός σχεδιαστής

Αποφάσεις — Διαδικασία



Μακροπρόθεσμος Μεσοπρόθεσμος | σχεδιαστής

Εθνική στρατηγική
Περιφ. ανάπτυξη
Τοπική ανάπτυξη

Δημόσιος/Ιδιωτικός τομέας

INTEGRATED PLANNING STUDY FOR THE ISLAND OF RHODES

Introduction

Ivica Trumbic
Assistant Director
Priority Actions Programme/Regional Activity Centre
UNEP-Mediterranean Action Plan

1 MAP and PAP: Integrated planning and management (IPM) in the Mediterranean

2 Integrated planning study: IPM on the island of Rhodes

3 Implementation: Tools and techniques of IPM

INTEGRATED PLANNING AND MANAGEMENT OF COASTAL AREAS

Importance for coastal areas

process of coastal development
sensitivity of coastal ecosystems
definition of coastal area
conflict situations

Dynamic process of achieving the goals of environmentally sound development taking in consideration physical, social, spatial, economic, financial, administrative and institutional constraints

Basic characteristics

process: no end product
action: only most important problems
coordination: links and interrelationships between sectorial plans, solving conflict situations
sustainable development
integration of environmental component in development process
resources management: use and conservation
goals: common for all Mediterranean countries, specific goals
approach: multidisciplinarity and interdisciplinarity

MAP AND PAP IMPLEMENTATION OF IPM PROCESS

- planning and management documents
- development and application of tools and techniques of IPM
- training
- sectorial activities integrated in planning and management documents

IMPLEMENTATION IN CAMP "THE ISLAND OF RHODES"

- scenarios development-environment
- integrated planning study
- tools: GIS, EIA, CCA
- other activities integrated in the study: study on impacts of climatic changes, water resources management, liquid waste management, etc.

PROBLEM STATEMENT: EXISTING PLANNING PRACTICE

- no document for the island as a whole
- only global development aspects defined
- sectorial orientation
- short planning period
- environmental aspects not prominent

WHAT IS INTEGRATED PLANNING STUDY

- first step in the establishment of the integrated planning and management process on the island

- practical tool for solving the existing development and environmental problems
  - identification of the major issues
  - definition of an outlook of the most feasible future development
  - assessment of the carrying capacity of important natural systems
  - proposal for a spatial strategy
  - proposal for management actions

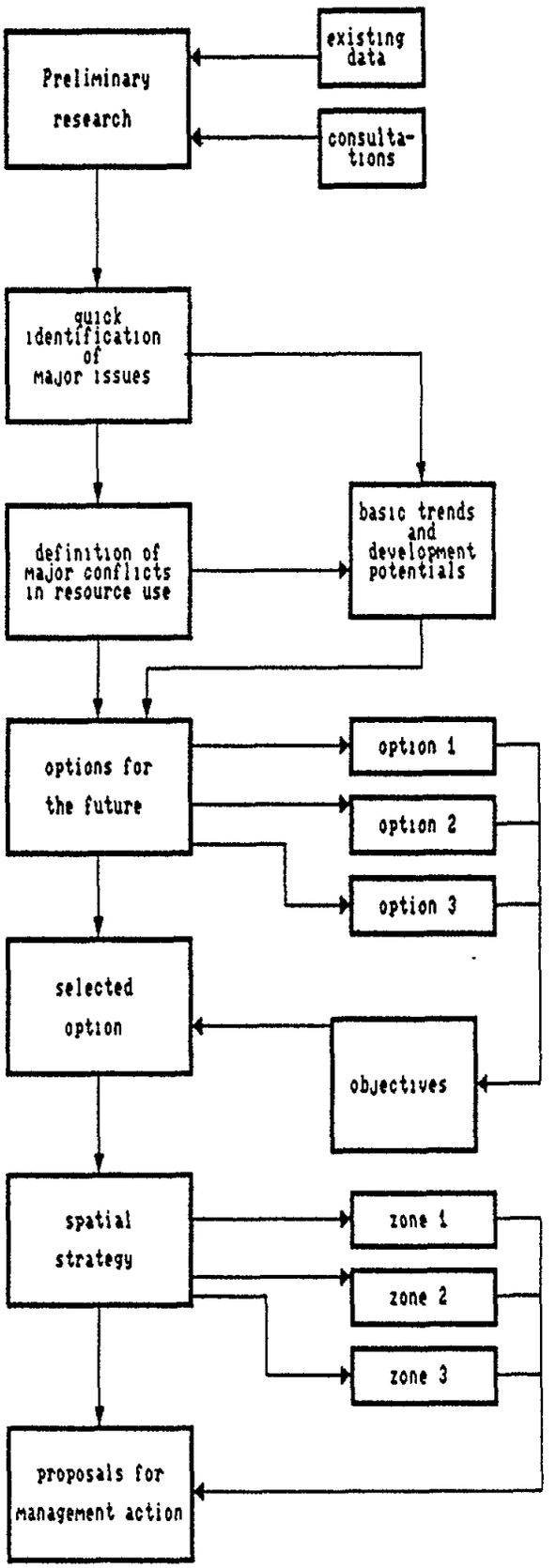
- principal objectives
  - integration of environmental component in early stage of planning
  - verification of planning actions through the assessment of their impacts on the environment and use of natural resources

- integrated planning study ***is not*** a plan

METHODOLOGICAL ASPECTS

- relatively comprehensive, but concentration on the most important issues
- time horizon: 2000 and 2010
- planning area: the island of Rhodes is a coastal zone
- disaggregated level: communities
- analysis and basic prospection
- implementation component
- use of practical tools and techniques
- inputs from other CAMP activities

PLANNING PROCEDURE



ACTIVITIES PERFORMED

- joint local/national/PAP team of experts established
- three missions to Rhodes
- two expert meetings
- sectorial reports prepared
- final report being drafted

FUTURE ACTIVITIES

- draft final report to be ready by the end of January 1993
- assessment of the study by the end of March 1993
- final report ready by the end of May 1993

PARTICIPATING EXPERTS

Ministry of the Environment, Physical Planning and Public Works

Ms. Fani Bazou, Ministry of the Environment, Physical Planning and Public Works, architect, planning system
Ms. Liani Anastassiadou, Ministry of the Environment, Physical Planning and Public Works, architect, land-use policy

Prefecture of Dodecanese

Mr. Christos Kolligris, Prefecture of Dodecanese, architect, head of the local team, institutional and financial arrangements
Ms. Persa Fokiali, Regional Service of the Ministry of the National Economy, economist, economic development, population and settlement policy
Mr. Aris Skiadopoulos, Prefecture of Dodecanese, geologist, environmental problems
Mr. Alexis Alexiadis, Prefecture of Dodecanese, geologist, water resources
Mr. Manolis Marias, Prefecture of Dodecanese, civil engineer, infrastructure
Mr. Petros Sirmos, Greek National Tourism Organisation, architect, tourism development

PAP

Mr. Ivica Trumbic, PAP, urban and regional planner, head of the PAP working team
Mr. Amram Pruginin, Israel, environmental planner, institutional aspects
Mr. Glafkos Constantinides, Cyprus, economist, economic development and financial and investment policies
Mr. Gojko Berlengi, PAP, urban and regional planner, physical planning and GIS liaison
Mr. Jonathan Glass, Israel, environmental planner
Mr. Miroslav Dragicevic, PAP, economist, tourism

CONTENTS OF THE STUDY

- **Introduction**: objectives, structure and methodological approach
- **Development and environment: present situation and trends**: present development and environmental processes, possible consequences pointed out should those processes continue at the same rate
- **Development and environment: options for the future**: basic spatial strategy of the development of the island
- **Management action programme**: actions to be performed in view of the implementation of the selected option of the spatial strategy of the island
- **Recommendations for immediate actions**: proposals of activities requiring urgent action

MAJOR ISSUES

- overdependence of the island economy on tourism
- emerging processes of environmental degradation
- inappropriate use of natural resources
- fragmented institutional structure for environmental management

OVERDEPENDENCE OF THE ISLAND'S ECONOMY ON TOURISM

- dominance of tourism in GDP on the island
  - 34% of total GDP
  - 36% annual growth rate
  - obvious economic benefits
  - decreased role of other economic activities

- employment growing faster than population
  - tourism 40% of total employment
  - lack of local labour force
  - migrations (within island and to the island)
  - relative population decrease in southern part

- concentration of the population in the "northern triangle"
  - triangle 74% of the population in 1991
  - city of Rhodes more than 50% of the population in 1991

- tourist accommodation increases faster than tourist arrivals
  - changing habits of tourism market
  - rigidity of tourism economy

- investments mostly in tourism
  - concentrated in the "northern triangle"
  - decisions made outside of the island and Greece

EMERGING PROCESSES OF ENVIRONMENTAL DEGRADATION

- generally acceptable environmental situation

- emerging problems
  - salination of water sources
  - sea pollution
  - soil erosion
  - overbuilding in the northern part of the island
  - uncontrolled construction of tourist facilities
  - problems in historic settlements
  - noise

INAPPROPRIATE USE OF NATURAL RESOURCES

- water resources
  - unequal distribution
  - increased water consumption (high index of exploitation)

- land use conflicts
  - location of solid waste disposal sites
  - coastal land encroachment
  - threats to natural systems
  - abandonment of traditional uses of land

- forests
  - forest fires
  - soil erosion

PROBLEMS OF INSTITUTIONAL STRUCTURE

- fragmented and scattered structure for environmental management
- some important authorities have marginal environmental sector
- lack of coordination among various authorities
- enforcement of environmental laws is complicated
- physical planning system is fragmented among local and national authorities
- lack of comprehensive monitoring

OPTIONS FOR THE FUTURE

key indicators (1990,1991)

population	100.000
labour force	40.000
basic employment	20.150
service employment	19.850
tourist beds	60.000
arrivals	1,100.000
tourist receipts	450 mil $

objectives

environmental quality
income growth

options

- continuation of the current development pattern (economic growth)
- environmental conservation
- sustainable development

ECONOMIC GROWTH OPTION

assumptions

increase in number of tourist beds	5% p.a.
average annual occupancy rate	85%
average length of stay	8 days
activity rate	36-38%
immigration	

water consumption 150-200 l (local), 500 l (tourists)

indicators

	2000	2010
tourist beds('000)	100	150
bednights(mil)	13.8	21.0
arrivals (mil)	1.7	2.6
labour demand('000)	60	100
local labour('000)	46	56
migrant labour('000)	14	44
water needs('000 m3 p.d.)	44	65
tourist receipts (mil$)	550	800

impacts

- additional beds will cause significant environmental damage
- increased migrant labour force, social problems
- moderate increase in tourist receipts

ENVIRONMENTAL CONSERVATION OPTION

assumptions

- reversal of existing development trends
- moratorium on new tourist accommodation
- sharp reduction of incentives to tourism
- strict planning controls and land use standards
- bednights and arrivals same as economic growth option
- no immigration

indicators

	2000	2010
tourist beds('000)	62	65
bednights(mil)	11.0	11.6
arrivals (mil)	1.3	1.5
labour demand('000)	43	46
local labour('000)	46	56
migrant labour('000)	--	--
water needs('000 m3 p.d.)	35	40
tourist receipts (mil$)	550	630

impacts

- protection of the environment
- slow down of economic growth
- reduction of employment opportunities
- marginal increase of tourist receipts
- new policies for employment in other sectors needed

SUSTAINABLE DEVELOPMENT

assumptions

- controlled increase in new beds (target areas)
- re-direction of investment policy
- tourist beds will grow according to the growth of the labour force
- diversification of the tourist "product"
- growth of tourist receipts
- designation of "target development areas"
- enforcement of land use standards

indicators

	2000	2010
population ('000)	130	160
tourist beds('000)	80	100
bednights(mil)	14.3	18.0
arrivals (mil)	1.7	2.0
labour demand('000)	53	66
local labour('000)	46	56
migrant labour('000)	7	10
water needs('000 m3 p.d.)	36	46
tourist receipts (mil$)	800	1100

impacts

- protection of the environment
- continuation of the economic growth
- moderate growth of the employment
- diversification of investment opportunities

GENERAL SPATIAL STRATEGY

basic principles

- island is divided in three zones
- existing development and environment situation
- policy proposals: different for each zone, complementarity

zones

SATURATED ZONE

- **area:** from Kalavarda to Lindos
- **description:** largest share of population, settlements, tourism
- **environment:** conflicts, pollution, resources exploitation
- **policy:** restoration, improvement of environmental conditions, slowdown of tourism growth, improvement of infrastructure

DEVELOPMENT ZONE

- **area**: coastal zone from Lindos to Prassonissi
- **description**: coastal settlements, small share of island population, extension of existing tourism capacities
- **environment**: non degraded, abundant resources
- **policy**: controlled development, targeted growth based on estimation of tourism carrying capacity, infrastructure development

HINTERLAND ZONE

- **area**: western and southwestern part of the island
- **description**: sparse settlement pattern, no tourism, agriculture
- **environment**: forests, valuable ecosystems, non degraded
- **policy**: conservation, complementarity with tourism in other zones

MANAGEMENT ACTIONS

1. Land use planning

- settlement system
- land use at community level
- infrastructure systems
- coastal zone planning

2. Environmental management

- environmental administration
- environmental education
- economic instruments for environmental management
- natural parks and natural reserves protection
- general waste management programme
- water management programme
- noise prevention and air quality control
- energy programme
- fire hazard management
- natural hazards and risk management
- planning for climatic changes
- environmental monitoring and research

3. Recommendations for immediate actions

- priorities for implementation
- institutional implications
- financial implications

TOOLS FOR INTEGRATED COASTAL ZONES PLANNING AND MANAGEMENT

- planning and implementation role
- needs of local authorities
- technical requirements
- training
- application: GIS, EIA, CCA

ENVIRONMENTAL IMPACT ASSESSMENT

- based on practical approach to EIA preparation
- enables decision makers to take into account the possible environmental effects of the project in consideration
- waste water treatment plant of city of Rhodes
- training course for local experts
- implementation

CARRYING CAPACITY ASSESSMENT FOR TOURISM

- combination of a planning approach and demand and supply analysis of tourism capacities
- possible capacity is envisaged and used as an input for planning proposals
- Afandou-Lindos area: development zone

SCENARIOS FOR THE PREDICTED CLIMATE CHANGE IN RHODES DEDUCED FROM SCENARIOS SUGGESTED BY IPCC AND THE UNIVERSITY OF EAST ANGLIA

SCENARIOS		TIME HORIZON			
		2030		2100	
IPCC GLOBAL (Business as usual)					
Temperature		+ 1.8°C (?)		3°C	
Sea level		+ 18 cm +/- 10 cm		+ 65 cm +/- 35 cm	
IPCC Southern Europe (Business as usual)					
Temperature		+ 2°C winter + 2 - 3°C summer		-	
Precipitations		+ 0 to 10 % winter - 5 to (-15 %) summer		-	
Soil moisture		- 15 to - 25 % summer		-	
Univ. East Anglia NE Med		°C global	for 1.8°C global	°C global	for 3°C global
Temperature	Winter	0.5-1.8	0.9-3.24	0.5-1.8	1.5-5.4
	Spring	0.6-1.4	1.08-2.52	0.6-1.4	1.8-4.2
	Summer	0.6-1.6	1.08-2.88	0.6-1.6	1.8-4.8
	Autumn	0.7-1.6	1.26-2.88	0.7-1.6	2.1-4.8
	Annual	0.7-1.5	1.26-2.7	0.7-1.5	2.1-4.5
Precipitations	Winter	-15 -6			
	Spring	-7 -15			
	Summer	-22 -26			
	Autumn	-18 -15			
	Annual	-6 -6			
Univ. East Anglia for Rhodes		°C per global °C	for +1.8°C global	°C per global °C	for 3°C global
Temperature	Winter	0.5-0.8	0.9-1.44	0.5-1.8	1.5-2.4
	Spring	0.6-0.8	1.08-1.44	0.6-0.8	1.8-2.4
	Summer	1.0-1.1	1.8-1.98	1.0-1.1	3.0-3.3
	Autumn	0.7-0.8	1.26-1.44	0.7-0.8	2.1-2.4
	Annual	0.7-0.8	1.26-1.44	0.7-0.8	2.1-2.4
		% per global °C	mm	% per global °C	mm
Precipitations	Winter	0-2	0-13	9-4.8	0-21
	Spring	4-6	5-10	7.2-14.4	10-17
	Summer	4-12	0.2-0.75	12-39.6	0.38-1.26
	Autumn	0-2	0-3.8	4.2-9.6	6.3-14.5
	Annual	-2-0	?(-21)-0	(-4.2)-0	(-30)-0

Κ Λ Ι Μ Α

Βασικοί παράγοντες

- χερσαία μάζα της Μικράς Ασίας
- περιβάλλουσα θαλάσσια μάζα
- ημι-ορεινή γεωμορφολογία

Τύπος κλίματος

Τυπικό μεσογειακό με δύο αντίθετες περιόδους

- ήπια ψυχρή & βροχερή περίοδο (Νοέμβρης-Μάρτης) 85% βροχής

- θερμή & ξερή περίοδο (Απρίλιος-Οκτώβριος) σημαντικοί ΒΔ-Δ ανέμοι, ετησίες
  χαμηλή υγρασία
  μεγάλη ηλιοφάνεια
  δροσερή θερμή περίοδο
  σε σύγκριση με την τριγύρω περιοχή

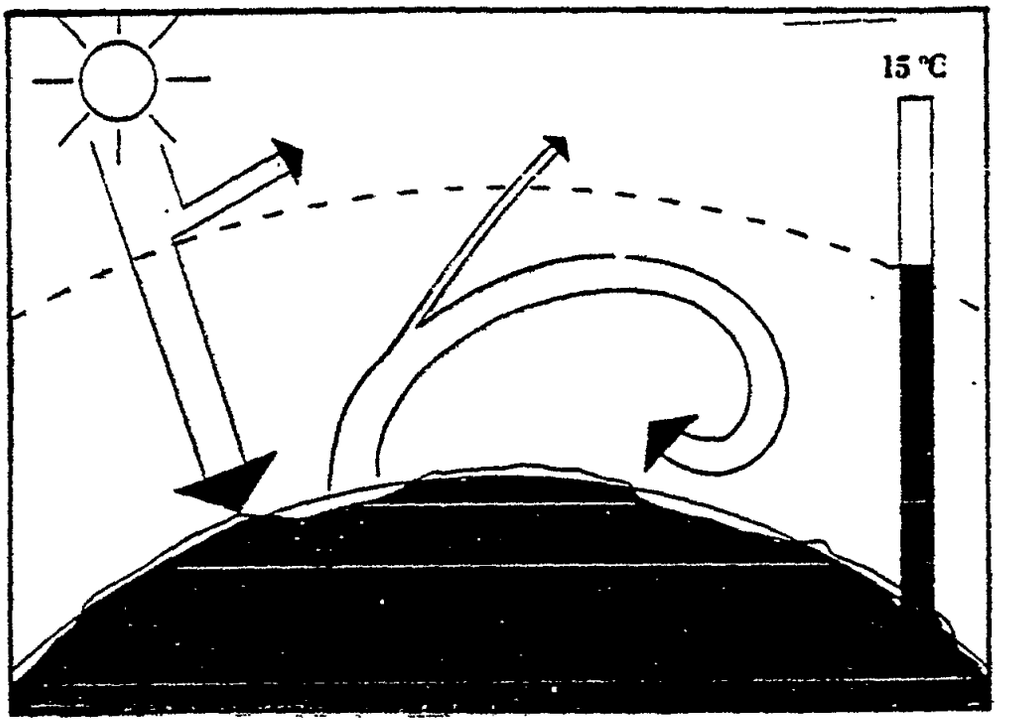
Κ Λ Ι Μ Α

* η αναμενόμενη άνοδος της θερμοκρασίας στη Ρόδο είναι η μικρότερη στην περιοχή της ΒΑ Μεσογείου

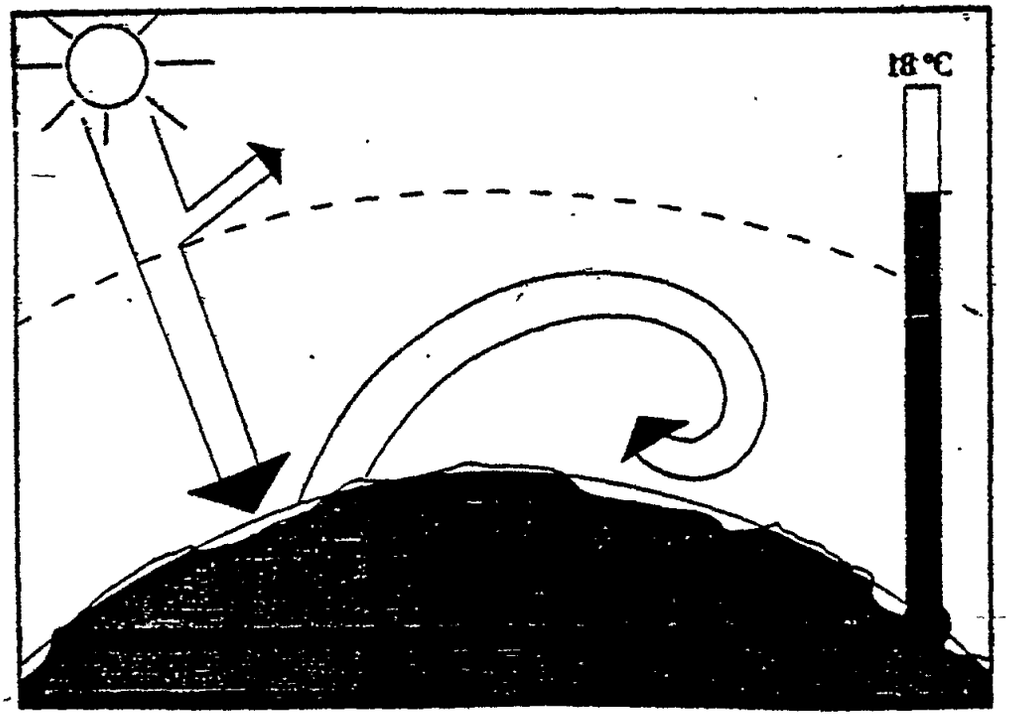
* δεν είναι σαφείς οι μεταβολές στην βροχόπτωση που εμφανίζουν μάλλον άνοδο κατά την ψυχρή περίοδο και αποκτά περισσότερο ραγδαίο χαρακτήρα καταιγίδας

Το νησί αναμένεται να διατηρείσει τον σημερινό χαρακτήρα της "όασης δροσιάς", και στο μελλοντικό θερμότερο περιβάλλον της ΒΑ Μεσογείου

Climate

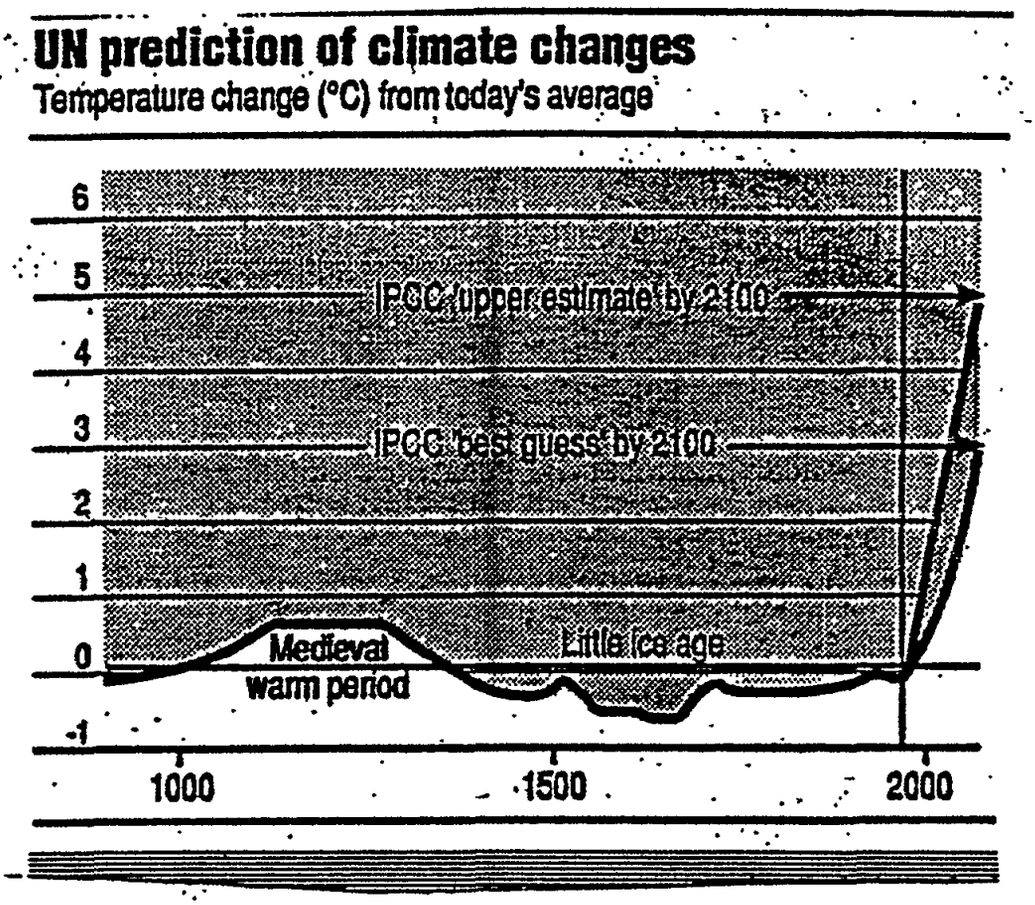


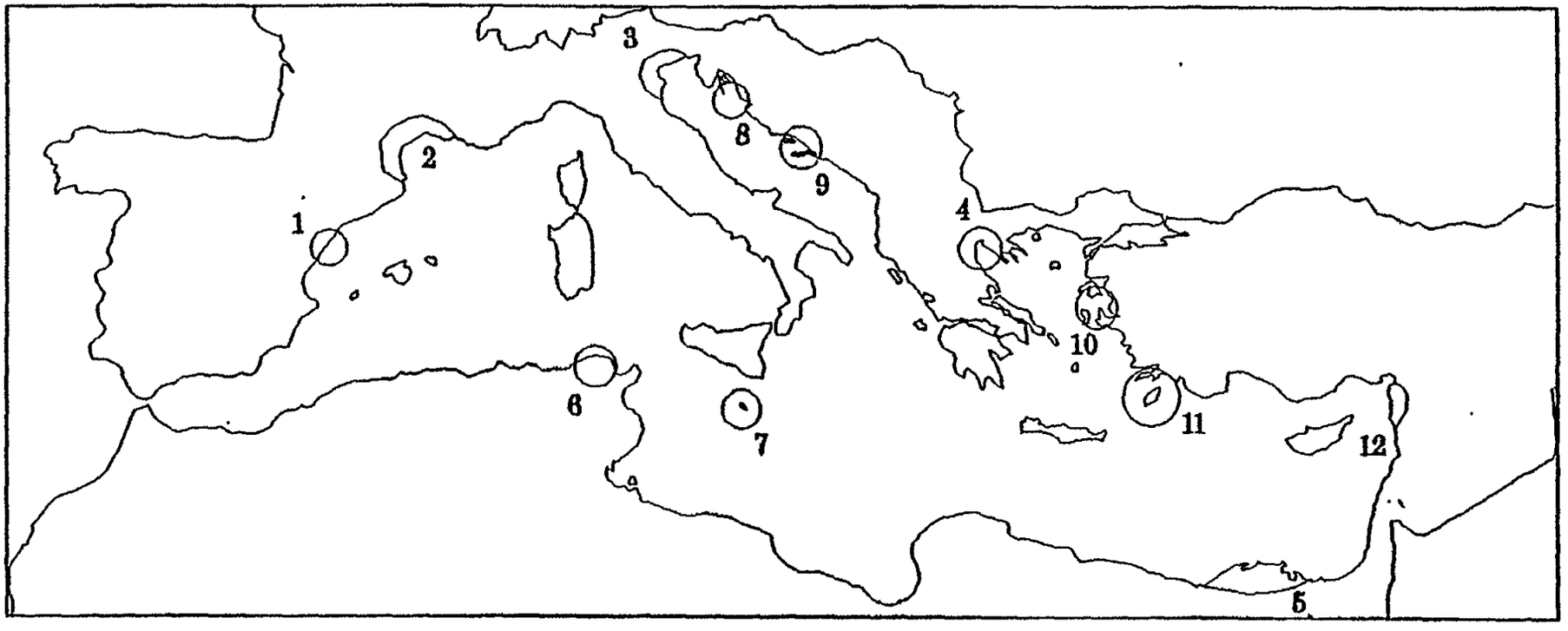
GREENHOUSE EFFECT AT PRESENT



GREENHOUSE EFFECT IN THE FUTURE

(From Maîtriser le réchauffement de la planète, Agence pour la Qualité de L'air, Paris)


UN prediction of climate changes
Temperature change (°C) from today's average
6
5
4
3
2
1
0
-1
IPCC 'upper estimate' by 2100
IPCC 'best guess' by 2100
Medieval warm period
Little Ice age
1000
1500
2000



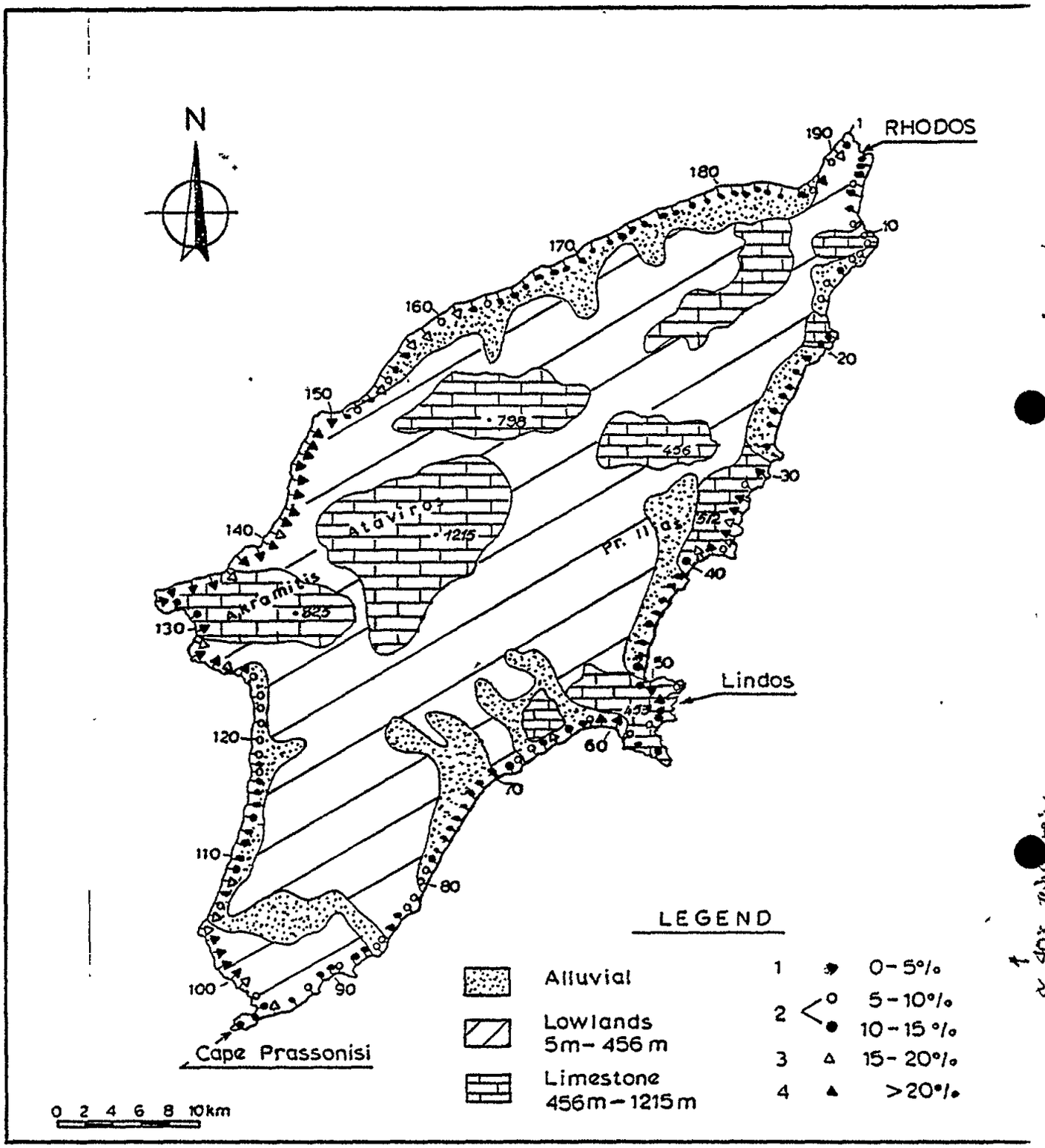
1987-1989

1. EBRO DELTA
2. GULF OF LION/RHONE DELTA
3. PO DELTA/VENICE LAGOON
4. THERMAIKOS GULF
5. NILE DELTA
6. LAKES ICHKEUL/BIZERTE

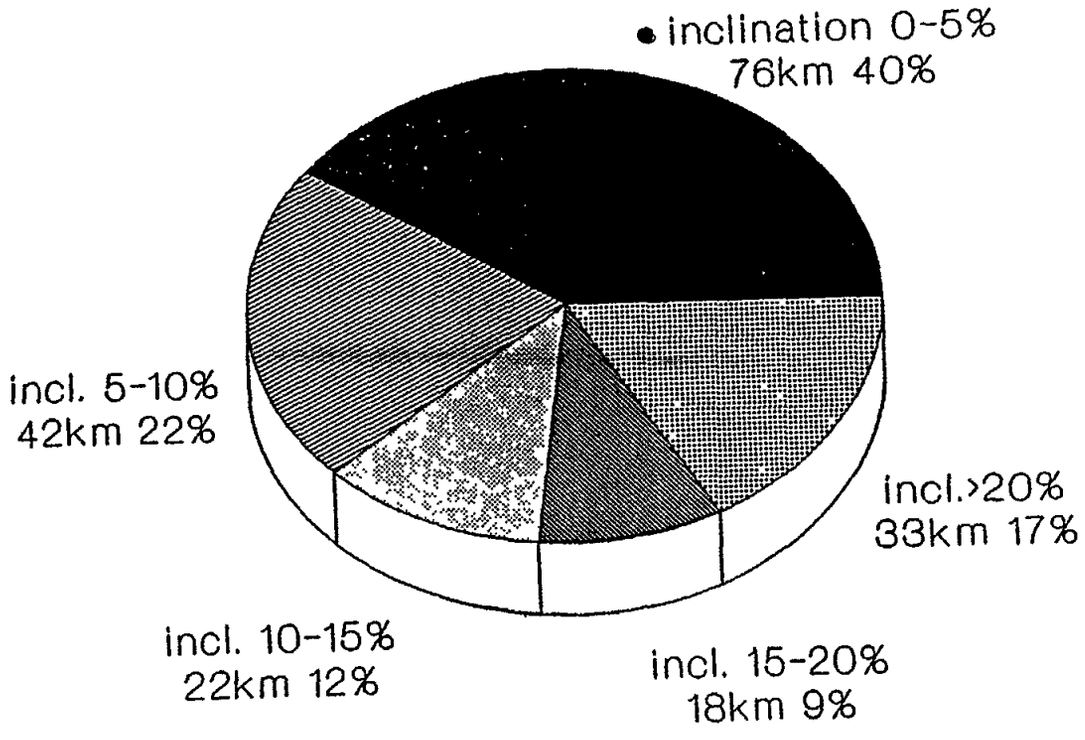
1990-1992

7. MALTA ISLAND
8. CRES/LOSINJ ISLANDS
9. KASTELA BAY
10. IZMIR BAY
11. RHODES ISLAND
12. SYRIAN COAST

Figure 1. The Mediterranean Region. Location of case studies on implications of climatic changes.


N
RHODOS
Lindos
Cape Prassonisi
Ataviros
Akramitis
Pr. Ilias
798
456
1215
825
512
453
LEGEND
Alluvial
Lowlands
5m – 456 m
Limestone
456m – 1215m
1 0 – 5%
2 5 – 10%
10 – 15 %
3 15 – 20%
4 >20%
0 2 4 6 8 10km

Coastal slope distribution of Rhodes



Total coastline length 191 km.

after Zamani, Sabot, Maroukian (1979)

ΠΑΡΑΚΤΙΑ ΓΕΩΜΟΡΦΟΛΟΓΙΑ

Κύριοι συντελεστές διαμόρφωσης ακτών

- Υψηλή δυναμική της ανοικτής θάλασσας
- Εισροή χερσαίων ιζημάτων
- Υψηλή τεκτονική δράση

ΒΟΡΕΙΟΤΕΡΟ ΑΚΡΟ

προστατεύεται από σημαντική λουρίδα αιγιαλού που περιβάλει την πόλη που είναι ίσως το αποτέλεσμα μιάς βραδείας τεκτονικής ανύψωσης

- ευαίσθητες περιοχές
  - λιμάνι
  - μεσαιωνικό τείχος
  - αποβάθρα
  - μικρές ημίκλειστες ΒΑ παραλίες

ΒΟΡΕΙΟΔΥΤΙΚΟ ΑΚΤΗ

ΙΞΙΑ-ΙΑΛΥΣΣΟΣ

- επιμήκης ακτή με βότσαλο
- υψηλής τουριστικής σημασίας
- πυκνές τουριστικές εγκαταστάσεις
- περιορισμένη εισροή ιζήματος
- ακτή εκτεθημένη στον έντονο Δ-ΒΔ κυματισμό
- έντονη διάβρωση και υποχώρηση ακτής
- μελέτη αναβάθμισης ακτής

⊛ Ολόκληρη η περιοχή χαρακτηρίζεται ευαίσθητη σε οποιαδήποτε ανύψωση της στάθμης της θάλασσας που θα επιταχύνει και θα επιδεινώσει τη διάβρωση με τεράστιες οικονομικές συνέπειες

ΠΑΡΑΚΤΙΑ ΖΩΝΗ ΚΡΕΜΑΣΤΗΣ, ΠΑΡΑΔΕΙΣΙΟΥ, ΘΕΟΛΟΓΟΥ, ΣΟΡΩΝΗΣ, ΑΡΧΑΙΑΣ ΚΑΜΕΙΡΟΥ, ΣΚΑΛΑΣ

- εκτεταμένη υποχώρηση ακτής (μέση ταχ. οπισθ. 1 μέτρο/χρόνο) και τοπικά μεγαλύτερες τιμές
- στενή ζώνη αιγιαλού
- ιδιοκτησίες, κατοικίες, και γεωργικές εκτάσεις με θερμοκήπια κοντά στην ακτογραμμή
- ύπαρξη αποβάθρας στις περιοχές Σορώνης και Θεολόγου
- εργοστάσιο παραγωγής ηλεκτρικής ενεργείας σε μικρή απόσταση από την ακτή

* Περιοχή ευαίσθητη σε οποιαδήποτε ανύψωση της στάθμης της θάλασσας
* επιτάχυνση της διάβρωσης

- διαβρωση παράκτιων κτισμάτων και γεωργικών εκτάσεων
- υφαλμύρωση - ποιοτική υποβάθμιση γονιμότητας εδάφους
- εργοστάσιο παραγωγής ηλεκτρικής ενεργείας (αυξημένη στάθμη)
- αποβάθρα περιοχής Σορώνης και Θεολόγου (αυξημένη στάθμη)

ΒΟΡΕΙΟ-ΑΝΑΤΟΛΙΚΗ ΑΚΤΗ
ΚΟΣΚΙΝΟΥ, ΚΑΛΥΘΙΕΣ, ΑΦΑΝΤΟΥ, ΑΡΧΑΓΓΕΛΟΣ, ΛΙΝΔΟΣ, ΓΕΝΝΑΔΙΟ

- Γενικά εκτεταμένη και φαρδιά ζώνη αιγιαλού με ομαλή κλίση ακτής, λόγω της ανοικτής θάλασσας
- σταθεροποιημένες αμμοθίνες στο κεντρο-ανατολικό μέρος
- μέτρια τουριστική ανάπτυξη

* Οι παράκτιες αυτές περιοχές ανταπεξέρχονται στην άνοδο της στάθμης της θάλασσας με ασήμαντες οικονομικές επιπτώσεις που θα γίνονται αισθητές από τις σταδιακές χειμερινές πλημμύρες. Υπάρχει και πρέπει να διατηρηθεί ελεύθερος ο αναγκαίος χώρος γιά την μελλοντική οπισθοχώρησή των.

* Οι επιπτώσεις θάναι οικονομικά σημαντικότερες σε μικρές τουριστικές ημίκλειστες παραλίες πού σταδιακά θα πλημμυρίσουν με την άνοδο της στάθμης

ΝΟΤΙΑ ΠΑΡΑΚΤΙΑ ΖΩΝΗ

- αξιοθαύμαστα ανεπηρέαστο παράκτιο σύστημα
- ελάχιστα οικονομικά αξιοποιημένη ζώνη
- σύστηματα αμμοθινών

* Ζώνη που αναμένεται νάχει ελάχιστες επιπτώσεις από την άνοδο της στάθμης εάν τηρηθεί επαρκείς διαχείριση έτσι ώστε να διατηρηθούν ζώνες που μπορούν νι φιλοξενήσουν την οπισθοχώρηση του αιγιαλού.

- μόνιμη αποκοπή νησίδος Πρασονησίου

ΕΔΑΦΗ ΚΑΙ ΧΕΡΣΑΙΑ ΔΙΑΒΡΩΣΗ

χαρακτηριστηκά:
- μειωμένη οργανική ύλη (λιγότ. 2%)
- μειωμένη υγρασία

* άνοδος της θερμοκρασίας
- άνοδος της εξατμισίοδιαπνοής κατά 10-15%
- μείωση της υγρασίας του εδάφους -10 έως -15%
- ελαφρά αλλαγή φυσικών ιδιοτήτων εδάφους κατά την ξηρασία

* άνοδος της στάθμης θάλασσας
- αύξηση αλατότητας παρακτίων γεωργικών εδαφών
- ελάχιστη αποσύνθεση οργανικών εδαφών

* αλλαγή χαρακτήρα βροχόπτωσης
- αύξηση ξηρασίας
- αύξηση επιφανειακής απορροής
- σημαντική αύξηση και επιδείνωση χερσαίας διάβρωσης

ΥΔΑΤΙΚΟ ΙΣΟΖΥΓΙΟ

- Ανοδος θερμοκρασίας
  - ξηρασία & αποψήλωση
  - ευνοείται η επιφανειακή απορροή
  - μειώνεται η κατύσδηση
  - περιορίζεται τροφοδοσία των υπογείων υδροφόρων οριζόντων
  - πτώση της στάθμης των υδροφόρων οριζόντων
  - αύξηση του κόστους άντλησης
  - μείωση της ροής των πηγών που σταδιακά θα σταματήσουν
  - εποχιακά αυξημένες ανάγκες
  - προβλήματα υπεράνλησης στο βόρειο τμήμα του νησιού (υφαλμύρωση)

- Ανοδος στάθμης
  - προέλαση υπόγειου μετώπου αλμυρού θαλάσσιου νερού
  - εποχιακά αυξημένες ανάγκες
  - υπεράνλησης στο βόρειο τμήμα του νησιού
  - ευνοείται και επιταχύνεται η υφαλμύρωση παράκτιων υδροφόρων οριζόντων

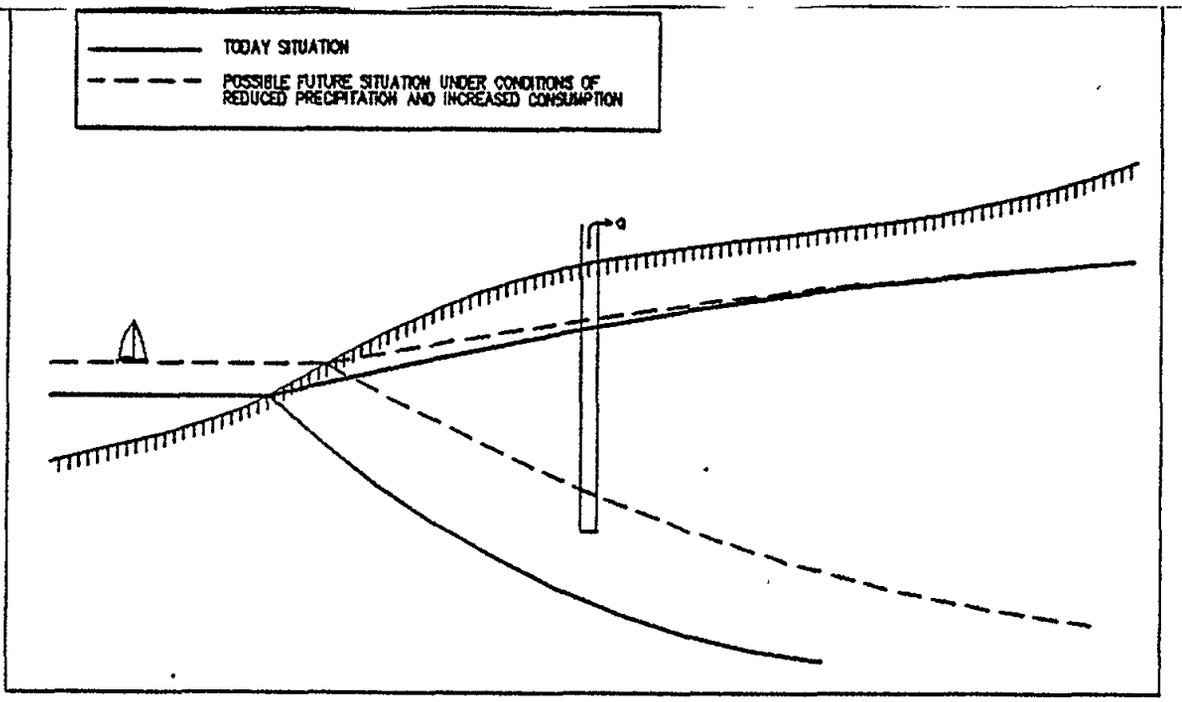


Fig. 32a - Schematic view of possible impact of [illegible] on the [illegible]

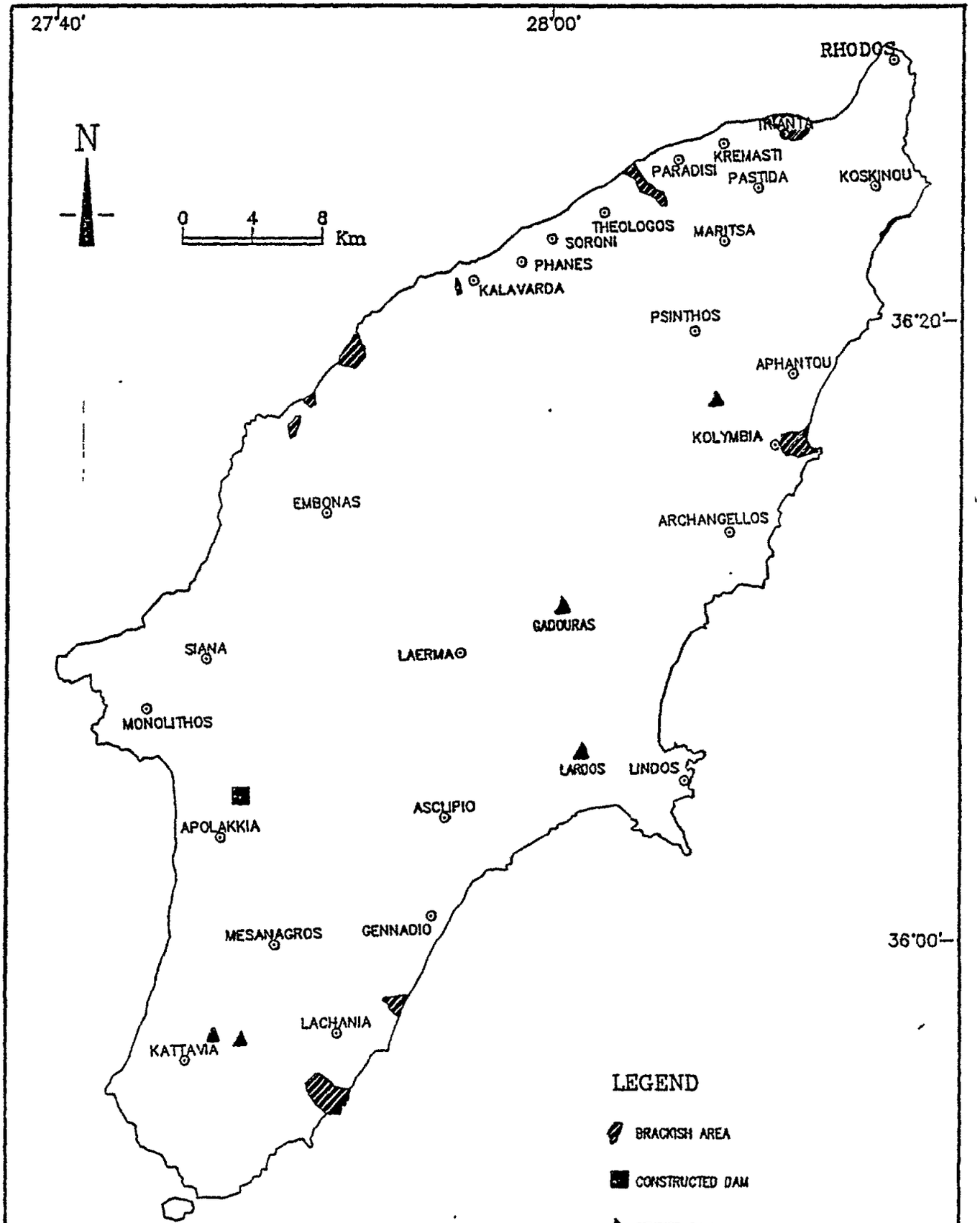


Fig. 5 Brackishness fronts and dam locations.

ΘΑΛΑΣΣΙΟ ΠΕΡΙΒΑΛΛΟΝ

- ρεύματα
- ύψος κυμάτων
- παράκτια ανάδυση βαθέων υδάτινων μαζών

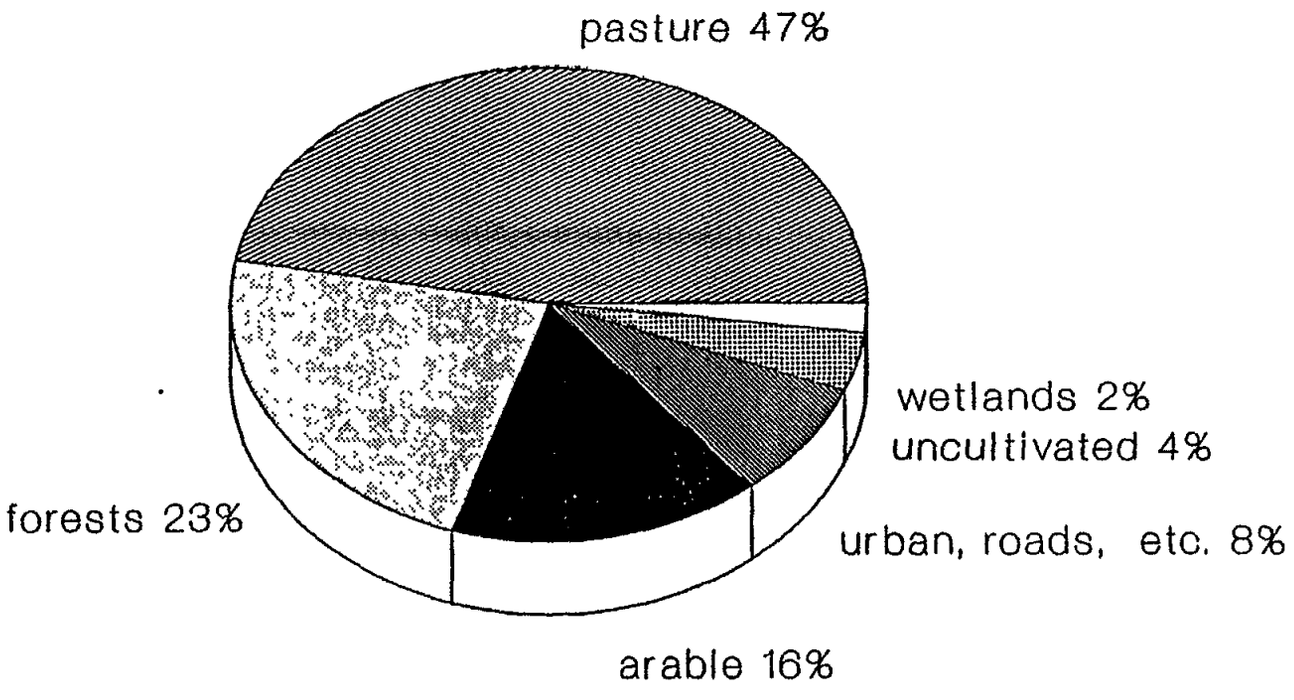
Συνθετοι ωκεανογραφικοί παράγοντες που κατέχουν υπερτοπικό χαρακτήρα

* Δεν είναι γνωστή η μελλοντική συμπεριφορά των

* Θα πρέπει να μελετηθούν σ' ολόκληρη την λεκάνη της ΒΑ Μεσογείου.

* Δεν υπάρχει κίνδυνος στρωμάτωσης των παράκτιων θαλάσσιων μαζών από την άνοδο της θερμοκρασίας

Land distribution (%)
Island of Rhodes



ΟΙΚΟΣΥΣΤΗΜΑΤΑ

- τα θαμνώδη οικοσυστήματα των φρυγάνων ευνοούνται καθόσο είναι ανθεκτικότερα σε ξηρό περιβάλλον με υψηλές καλοκαιρινές θερμοκρασίες
- ευνοούνται οι πυρκαγιές
- δεν είναι σαφής η επίδραση στο νησί της βιοκλιματικής μετατόπησης των ζωνών προς βορρά ως προς την μετανάστευση νέων ειδών
- αναμένεται προσαρμογή των καλλιεργούμενων ποικιλιών στις νέες κλιματικές συνθήκες
- ευνοείται ο ενδιμισμός καλλιεργούμενων ειδών από θερμότερα κλίματα
- είναι άγνωστες οι συνέπειες στο πληθυσμό των εντόμων του νησιού που όμως ευνοούνται από την άνοδο της θερμοκρασίας
- οι κλιματικές αλλαγές αναμένεται μεταβάλουν τις συνθήκες των βιοτόπων της πεταλούδας
- ευνοούνται τα βακτηρίδια και οι παθογενείς οργανισμοί
- δεν αναμένονται σημαντικές αλλαγές στα θαλάσσια οικοσυστήματα του νησιού που ευνοούνται από την άνοδο της θερμοκρασίας

ΚΟΙΝΟΝΙΚΟ-ΟΙΚΟΝΟΜΙΚΑ

- διεύρυνση της τουριστικής περιόδου

* επιπτώσεις ανόδου της θαλάσσιας στάθμης στα έργα υποδομής

- λιμάνι
- πόλη
- παραλιακές τουριστικές εγκαταστάσεις

- αποχετευτικό δίκτυο
- βιολογικοί καθαρισμοί
- ιχθυοκαλλιέργειες
- άρδευση

- εργοστάσιο ΔΕΗ
- αεροδρόμιο

IMPACT ZONES

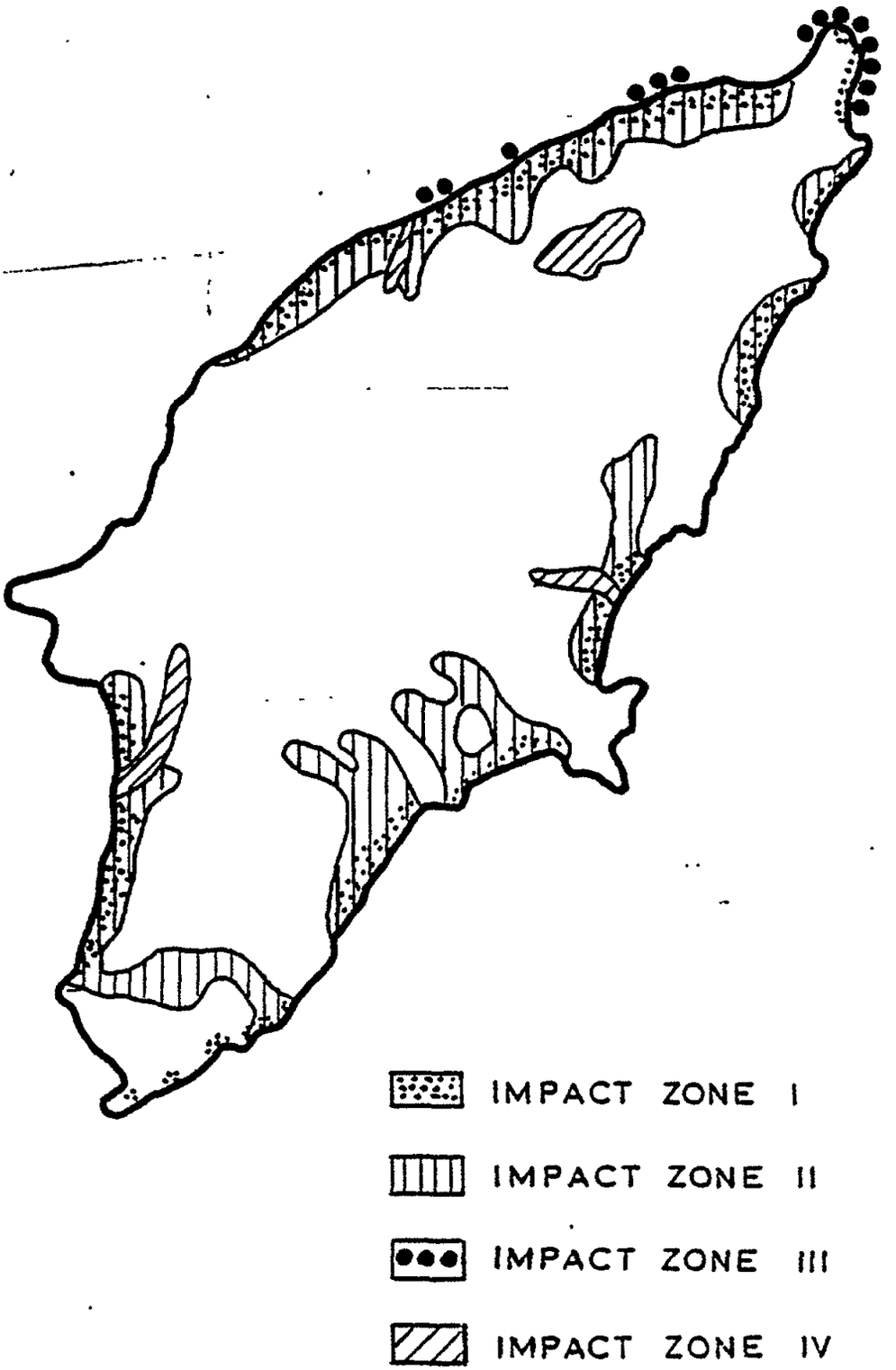


Fig 30 - Impact zones for Bintan Island

ΠΡΟΤΑΣΕΙΣ - ΔΡΑΣΗ

Διαχείριση παράκτιας ζώνης

* αναχαίτιση διάβρωσης
- αναδάσωση καμένων περιοχών
- διευθέτηση χειμάρρων

- ευθυγράμμιση οικιστικής νομοθεσίας γιά τη παράκτια ζώνη (ασφαλίσεις, αποζημιώσεις)

- σχεδιασμός χρήσεων παράκτιας ζώνης - αιγιαλού
- προστασία παράκτιων πυκνοδομημένων οικονομικών περιοχών
- μετανάστευση απειλούμενων δραστηριοτήτων

- πρόνοια ζωνών υποδοχής της υποχωρούσης ακτογραμμής σε αναπτυσσόμενες περιοχές

- εφαρμογή διαχείρισης ακτών

Διαχείριση υδάτινων πόρων

- προστασία παράκτιων υδροφόρων οριζόντων
- παρακολούθηση της ποιότητας νερού
- εκσυχρονισμός δικτύου διανομής
- ελαχιστοποίηση απωλειών αστικού δυκτίου
- εφαρμογή υπογειων μεδόθων γεωργικής άρδρευσης
- ανακύκλωση/επαναχρησιμοποίηση βιολογικά καθαρισμένου νερού
- αναδάσωση
- αξιοποίηση καρστικών υδροφόρων οριζόντων περιοχής Αρχαγγέλου
- κατασκευή φραγμάτων

Διαχείριση οικοσυστημάτων

- περιορισμός βοσκής
- οριοθέτηση βοσκοτόπων
- αναδάσωση υπό εξειδικευμένη επιστημονική επιβλεψη

Προτάσεις για άμεση δράση

- χαρτογράφηση μελλοντικής ακτογραμμής για άνοδο στάθμης 1 μέτρου
- αποτύπωση υπαρχόντων παράκτιων κτισμάτων και έργων υποδομής
- μελέτη ισοζύγιου ιζημάτων ΒΑ ατκής
- εφαρμογή προγράμματος διαχείρισης όλων των υδάτινων πόρων
- αναπροσαρμογή των παράκτιων οικιστικών κανόνων και σχεδιασμός χρήσεων παράκτιας ζώνης

Προτάσεις γιά μακροχρόνια δράση

- παρακολούθηση των τοπικών παραμέτρων:
  - μετεωρολογικών
  - ωκεανογραφικών
  - κλιματικών

  και σύγκριση των με αυτές που περιλαμβάνονται στο σενάριο του Guo et al. (1991)

- μελέτη της υδρογεωλογικής συμπεριφοράς των λεκανών του νησιού

- μετρήσεις της στερεοπαροχής των ποταμών και χειμάρρων του νησιού

- αυστηρή παρακολούθηση της εφαρμογής της νομοθεσίας

ΠΑΡΑΜΕΤΡΟΙ	ΠΡΟΒΛΗΜΑ	ΠΕΡΙΤΟ ΠΡΟΒΛΗΜΑ	ΠΡΟΒΛΗΜΑ
I/ ΝΟΜΟΘΕΣΙΑ - ΥΠΗΡ. ΔΟΜΗ - ΟΡΓΑΝΩΣΗ			
- Υπάρχουσα Νομοθεσία		X	
- Υπάρχουσα δομή			X
- Εκτελεστική δυνατότητα		X	
- κατανομή αρμοδιοτήτων		X	
- δομή επικοινωνίας			X
- προσωπικό / μέσα			X
- Υπάρχον πρόγραμμα ΕΖΜΡ		X	
- Επίπεδο μορφ. προσωπικού			X
- γνώση manager (προσων.)		X	
- Νοοτροπία προσωπικού		X	
II/ ΟΙΚΟΝΟΜΙΑ - ΧΡΗΜΑΤΟΔΟΤΗΣΗ			
- Δυνατότητα Εθν. Οικονομίας	X		
- Δυνατ. Εθν. - Περιφ. οικονομίας	X		
- Δυνατ. χρημ. διεθν. αγορ.			X
- Δυνατότητα Management		X	
III/ ΤΕΧΝΟΛΟΓΙΑ			
- Τεχνολ. Γνώση - Εμπειρία		X	
- Τεχνολ. υπηρεσίας/οργανισμοί			X
- Οργαν. δομές		X	
- Προσωπικό & Μέσα			X
- Επίπεδο μόρφωσης Προσωπ.		X	
- Τεχνολογ. ικανότητες - δυνατ.			X
- Νοοτροπία προσωπ.			X
- Υπάρξη - διάθεση στοιχείων		X	
IV/ ΠΟΛΙΤΙΣΤΙΚΑ - ΚΟΙΝΩΝΙΚΑ			
- πολιτιστικό επίπεδο			X
- κοινωνικό & οικον. επίπεδο		X	
- πολιτιστ. προτερήματα		X	
- κοινων. οικονομ. προτερήματα			X
- επιρροή πολιτιστ. καταστάσεων			X
- επιρροή κοινων. οικον. καταστ.		X	

ΣΥΝΟΠΤΙΚΗ ΕΚΤΙΜΗΣΗ ΠΡΟΫΠΟΘΕΣΕΩΝ ΓΙΑ ΕΦΑΡΜΟΓΗ ΤΩΝ ΜΕΤΡΩΝ.

ΒΑΘΜΟΣ ΠΡΟΒΛΗΜΑΤΟΣ / ΠΑΡΑΜΕΤΡΟΙ	ΧΑΜΗΛΟΣ	ΜΕΣΟΣ	ΥΨΗΛΟΣ	ΚΡΙΣΙΜΟΣ
ΝΟΜΟΘΕΣΙΑ - ΔΟΜΗ - ΟΡΓ.		X		
ΟΙΚΟΝΟΜΙΑ - ΧΡΗΜ/ΣΗ			X	
ΤΕΧΝΟΛΟΓΙΑ		X		
ΠΟΛΙΤΙΣΤ. - ΚΟΙΝΩΝ.	X			

WATER RESOURCES MASTER PLAN

WORK PLAN

* IGME - ATHENS; COORDINATOR OF THE PROJECT

* UNEP-MAP-PAP/RAC; PROJECT CONSULTANTS AND COORDINATION

REALIZED

* GENERAL CONTENTS AND ELEMENTS OF THE WATER RESURCES MASTER PLAN

IN REALIZATION

* DEVELOPMENT OF THE SITE SPECIFIC PROJECT DOCUMENT

FUTURE PHASES

1. ALTERNATIVE

   * REALIZATION IN ACCORDANCE WITH THE CONTRACT DOCUMENT
     (complete and detailed Water Resources Master Plan)

   * TWO YEARS PROJECT

   * COST ca 400,000 USA $

   * REALIZATION IN ACCORDANCE WITH CONTRACT DOCUMENT

2. ALTERNATIVE

   * DEVELOPMENT OF THE STUDY OF THE GENERAL WATER RESOURCES DEVELOPMENT PLAN
     (study on the base of currently available documents and data)

   * SIX MONTHS STUDY

   * COST ca 20,000 USA $

   * PAP/RAC REALIZATION

CONTENTS:

CONTENTS AND ELEMENTS OF WATER RESOURCES

MASTER PLAN FOR THE ISLAND OF RHODES

A. CHARACTERISTICS OF THE AVAILABLE WATER RESOURCES

A.1. HYDROCLIMATOLOGICAL FACTORS

A.1.1 General Statements

A.1.2 Study of climatological factors

A.1.2.1 Selection of the period under study

A.1.2.2 Duration of sunny and cloudy periods

A.1.2.3. Global radiation

A.1.2.4. Air temperature

A.1.2.5 Soil temperature

A.1.2.6 Precipitation (rainfall)

A.1.2.7 Snow (if any)

A.1.2.8 Hail

A.1.2.9 Air humidity and water vapour pressure

A.1.2.10 Air pressure and wind

A.1.2.11 Evaporation

A.2 REGIME AND QUALITY OF SURFACE WATER

A.2.1 Regime of surface water

A.2.2.1 General characteristics of the catchment area and background informations

A.2.1.2 Hydrological past studies of the area

A.2.1.3 General study of hydrological data and their completion

A.2.1.4. Average discharge

A.2.1.5 High water levels (floods)

A.2.1.6 Low water levels

A.2.1.7 The sediment regime

I.1 SELECTION OF THE OBJECTIVE FUNCTION (CRITERIA) AND CONSTRAINTS

I.1.1 Criteria (economical and physical)

I.1.2 Constraints

I.2 ECONOMIC PARAMETERS

I.2.1 Investment, operation costs and system maintenance costs

I.2.2 Economic evaluation of the system

I.3 OPTIMIZATION OF THE ANALYSES AND SYSTHESES OF ALTERNATIVE WATER SUPPLY SOLUTIONS

I.3.1 Optimization of the analyses of possibilities of individual reservoirs in the system from the multipurpose water exploitation standpoint.

I.4 REVIEW OF WATER RESOURCES POSSIBILITIES OF THE CONSIDERED SOLUTIONS

I.5 PROPOSAL OF THE SOLUTION

I.5.1 Presentation of activities and measures

I.5.2 Water distribution (of water)

I.5.3 Distribution of investment costs and costs per user

I.5.4 Economical effects of the optimal solution

I.5.5 Sensitivity analysis of the optimal solution

J. CONDITIONS OF THE REALIZATION FOR THE SUGGESTED WATER SUPPLY SOLUTION

J.1 LEGAL AND CONSTITUTIONAL ACTS

J.2 ORGANIZATION

J.3 NECESSARY INVESTIGATIONS, ADDITIONAL STUDIES AND PROJECTS

J.4 WATER CONSERVATION PROGRAM

J.5 DROUGHT WATER MANAGEMENT

F.3.3 Possibility and procedure for satisfying the required water quality of the recipient.

F.3.4 Development of technical economic functions of the waste water treatment

F.3.5 Determination of the recipient capacity and the required degree of waste water purification for each settlement

F.3.6 Interaction with other users and interest for water resources

F.3.7 Determine of minimal biological water flow

G WATER EXPLOITATION (WATER USAGE)

G.1 WATER SUPPLY FOR SETTLEMENTS AND INDUSTRY

G.1.1 Comments on the available data

G.1.2 Water supply for settlements and Industry

G.1.2.1 General considerations

G.2.2 Present state and developmental trends of the water supply system:

G.1.2.3 Future water supply of the settlements and industry

G.1.2.4 Definition of protection zones of water supply sources

G.2 WATER SUPPLY IN AGRICULTURE

H SYNTHESIS OF WATER DEMANDS

H.1 WATER DEMAND FOR THE WATER SUPPLY OF URBAN AREAS AND INDUSTRY

H.1.1 Water demand for the urban areas

H.1.2 Water demand for industry

H.2 WATER DEMAND FOR TOURISM AND RECREATION

H.3 WATER DEMAND FOR IRRIGATION

H.4 WATER DEMAND FOR FLOOD PROTECTION

H 5 WATER DEMAND FOR THE PROTECTION OF WATER QUALITY

H.6 WASTEWATER REUSE QUANTITY

I. ANALYSIS AND SELECTION OF WATER SUPPLY SOLUTIONS

C.2.5.1 Review of the capacity of the center services in 1980 and 1990 and the evaluation of the perspective in (2015)

C.2.6 Presentation of the main indicators for the achieved level of the development of the contruction industry, trade and housing contruction and the evaluation of development until (2015)

C.2.7. General presentation of the level of the demographic, urban and economic development, estimation of possibilities, trends and dynamics of development in the future

D WATER STORAGE

D.1 SURFACE STORAGE BASINS (OF SURFACE WATER)

D.2 UNDERGROUND RESERVOIRS

D.3 ANALYSIS OF THE INFLUENCE OF THE SURFACE AND UNDERGROUND RESERVOIRS UPON THE WATER REGIME

E. PROTECTION FROM WATER

E.1 STREAMFLOW REGULATION AND FLOOD PROTECTION

E.1.1 Presentation of the present situation

E.1.1.1 Present state of the streamflow regulation and flood protection

E.1.1.2 Past and potential damage from floods and unregulated streamflows

E.1.3 Demand for flood protection and classification of streamflows and sections considering the range of the possible damage from floods

E.1.4 Alternative solutions of streamflow regulation and protection from floods

E.2 PROTECTION FROM EROSION AND TORRENTS

E.2.1 Required alternative works on the torrents regulation and protection from erosion in the endangered areas.

E.2.2 Explanation and justification of the suggested works and measures

E.2.3 Estimation and calculation of the proposed activities

E.2.4 Map of the suggested activities with a scale 1:100,000

E.3 DRAINAGE

E.3.1 Present state

E.3.2 Analysis of the possible activities for the excess water drainage

E.4 SEWER SYSTEM IN THE SETTLEMENTS AND INDUSTRY

E.4.1 Review of the used data bases

E.4.2 Sewer system in the settlements and industry

E.4.2.1 Present state.

E.4.2.2 Future state in (2015).

F WATER PROTECTION

F.1 WATER CLASSIFICATION

F.1.1 Review of indicators and permissible limit values for each category.

F.1.2 Methods for the determination of indicators and procedures for performing analyses

F.1.3 Method of interpreting the obtained results and determination of the characteristic and reliable values

F.2 PRESENT STATE OF POLLUTION

F.2.1 Presentation of the waste water quantity and quality

F.2.2 Presentation of the equipment in the settlements and industry for the purification of waste water

F.2.3 Review of other types of pollution

F.2.4 Presentation of the tendencies in the recipient quantity and quality of some larger catchments

F.2.5 Presentation of the past efforts in solving the future situation

F.3 MEASURES AND ACTIVITIES INTENDED TO REDUCE THE WATER POLLUTION

F.3.1 Predicted quantities and quality of the domestic and industrial waste water

F.3.2 Analysis of the physical regime of the recipient and determination of reliable discharges

C SICIO ECONOMIC FACTORS AND DEVELOPMENT WATER DEMAND

C.1 POPULATION, SETTLEMENTS AND INDUSTRY

C.1.1 Present state

C.1.1.2 Perspective until the year (2015)

C.1.2 Settlements

C.1.2.1 Presentation and characteristics of the present urban development of the area

C.1.2.2 Estimation of the urban development until (2015)

C.1.2.3 List of settlements with more than 500 inhabitants (according to census from 1990 and estimations for (2015)

C.1.3 Review map showing the poplulation density and settlements with more than 500 inhabitants (state in 1980 and estimation for (2015))

C.1.4 Industry and mining

C.1.4.1 Present state

C.1.4.2 Perspective until (2015)

C.2 AGRICULTURE, FORESTRY AND OTHER ECONOMIC BRANCHES

C.2.1 Agriculture

C.2.1.1 Present state of production

C.2.2 Forestry

C.2.3 Energetic (if any)

C.2.3.1 Present state

C.2.3.2 Future state

C.2.4 Traffic (Transportation)

C.2.4.1 Road traffic

C.2.4.2 Review map of the existing roads and the road network in future (2015)

C.2.5 Tourism, spsort and recreation

B. IMPORTANT NATURAL FACTORS

B.1 SOIL

B.1.1 Position and size of the area

B.1.2 Natural conditions

B.1.2.1 Relief as a pedogenetic factor and as an indirect factor in moisturing the boundary low arable areas

B.1.2.2 Influence of the geological basis and lithological composition of the basis on the genesis and regime of soil moisturing

B.1.2.3 Influence of surface streamflows on the soil cover, their erosion storage role drainage capacity and the influence of the moisturing regime in the river valley

B.1.2.4. Review of the climatological conditions, from the pedogenesis standpoint and the main specific differences between the flat and mountainous areas

B.1.2.5. Vegetation

B.1.3 Typological soil structure, considering the small scale 1:100.000, will be reduced to the level of the basis. Some areas significantly differ typologically and the solution will cover whole complexes, stressing the dominant type of the soil

B.1.4 Physical chemical properties of the soil, with special attention paid to the water regime of hydromorhic soils and the soil types which have to be irrigated or drained

B.1.5 Production properties and the application of the necessary agromers in order to improve the water and aerial regime of the soil, particularly regarding the irrigation requirements

B.1.6 The soil bonity (quality) will be achieved using the current methods, with the evaluation of the soil suitability for irrigation and the zones for drainage

B.1.7 Hypsometric map for the regionalization of agricultural production.

B.2 EROSION AND TORRENTS

B.3 ORES

B.4 SPECIALLY PROTECTED AREAS

A.2.1.8 Drought analyses

A.2.1.9 Thermic regime

A.2.2 Quality of surface water

A.2.2.1 Tabular review of the station for monitoring the water quality, monitoring period and the observed parameters

A.2.2.2 Tabular presentation of the streamflow with the notation of the pollution category

A.2.2.3 Presentation of the present state of the surface water quality according to existing monitoring programmes, and trend analyses

A.3 HYDROGEOLOGY, REGIME AND QUALITY OF UNDERGROUND WATER

A.3.1. Underground water regime

A.3.2. Data collection

A.3.2.1. Geological and structural study

A.3.2.2. Reconnaissance drilling

A.3.2.3. Electrical logging of existing observation boreholes network

A.3.2.4. Water level elevation data

A.3.2.5. Hydrodynamical parameter survey

A.3.2.6. Water quality

A.3.2.7. Water transfer in non saturated medium

A.3.2.8. Groundwater discharge into the sea

A.3.2.9. Land use impact on watersheds

A.3.2.10. Water extraction

A.3.2.11. Identification of pollution sources

A.3.3. Hydrogeological characteristics of the area and description of the aquifer system

A.3.4. Modelling

~~A.4. Development of data bank~~

A.5. NATURAL WATER BALANCE

WATER RESOURCES MASTER PLAN

* LONG TERM OBJECTIVE
  protection of the water resources on the island and their optimal utilization

* IMMEDIATE OBJECTIVES
  solution of the current problems in protection and exploitation of fresh water resources

* EXPECTED BENEFITS
  harmonic development and protection of the natural resources of the island,
  increased knowledge in the field of water resources management,
  rational management and use of water resources.

BACKGROUND

* TWO MISSIONS OF EXPERTS
* WATER RESOURCES PER CAPITA 909 m^3/capita/year
* WITH TOURISTS WATER RESOURCES PER CAPITA 757 m^3/capita/year

UNDER CRITICAL TRESHOLD OF
1000 m^3/capita/year

* INDEX OF EXPLOITATION CA 35 %

25 % BEGINNING TO WIGHT NATIONAL ECONOMY

50 % STRONG PRESSURE ON THE RESOURCES

CONFLICTS OVER USE

NECESSITY FOR PLANNING AND PRIORITY ALLOCATIONS

* CONCLUSION

- SITUATION REGARDING WATER RESOURCES BECOME CRITICAL
- POLLUTION OF GROUND WATER
- SEA INTRUSION ESPECIALY AT NORTH
- OVEREXPLOITATION ON THE NORTH
- POTENTION OF CHEMICAL CONTAMINATION FROM AGRICULTURE

FIGURE C: SEQUENTIAL USE

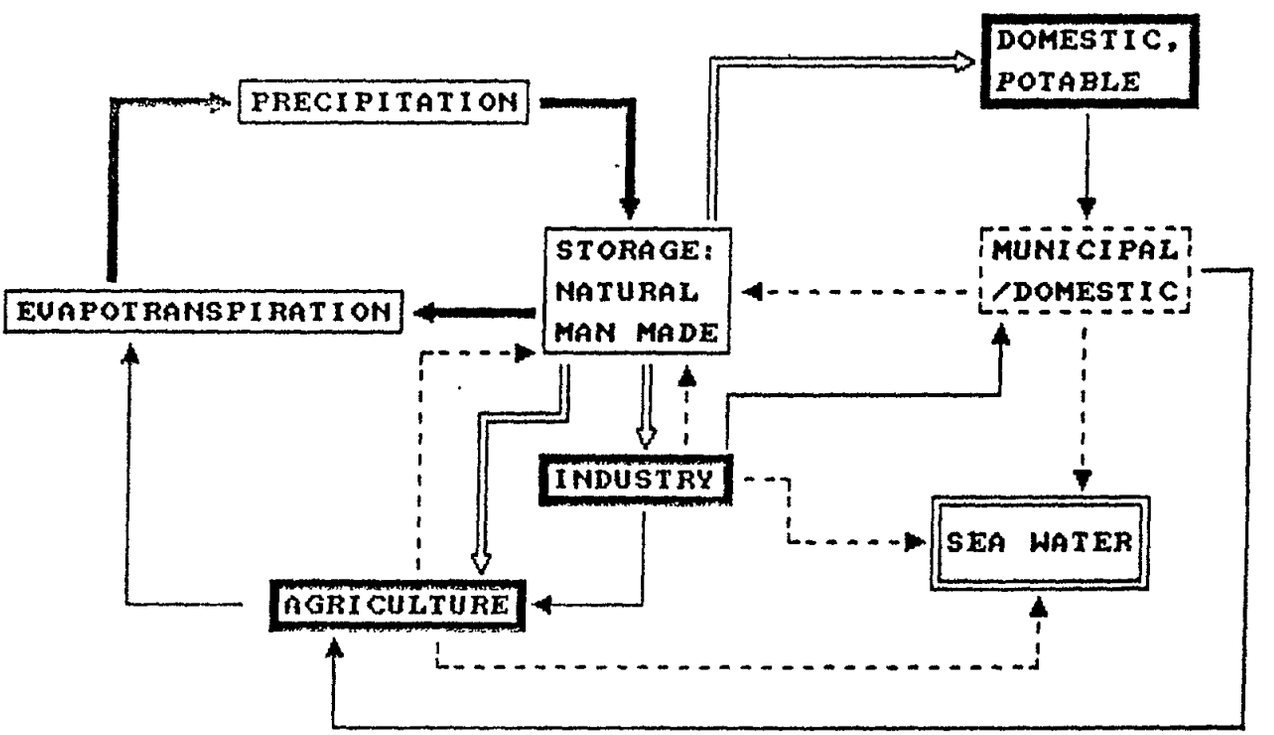
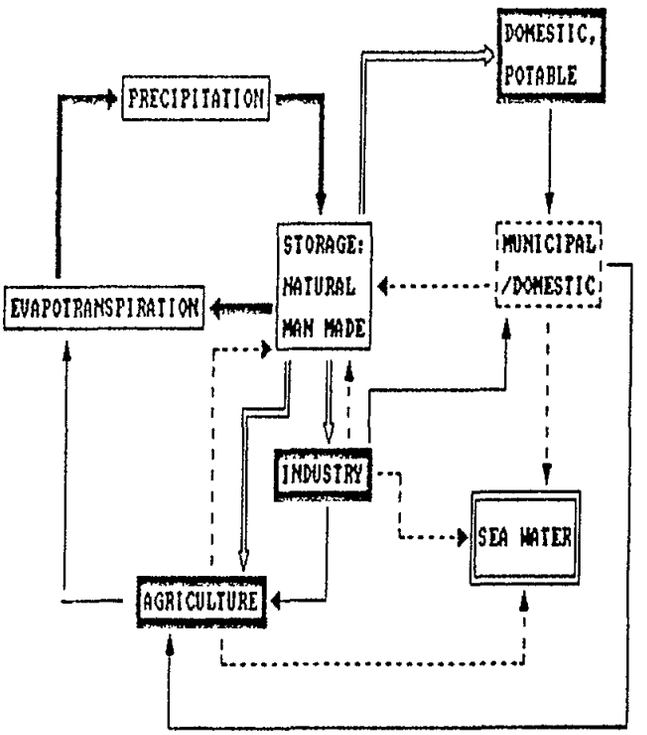
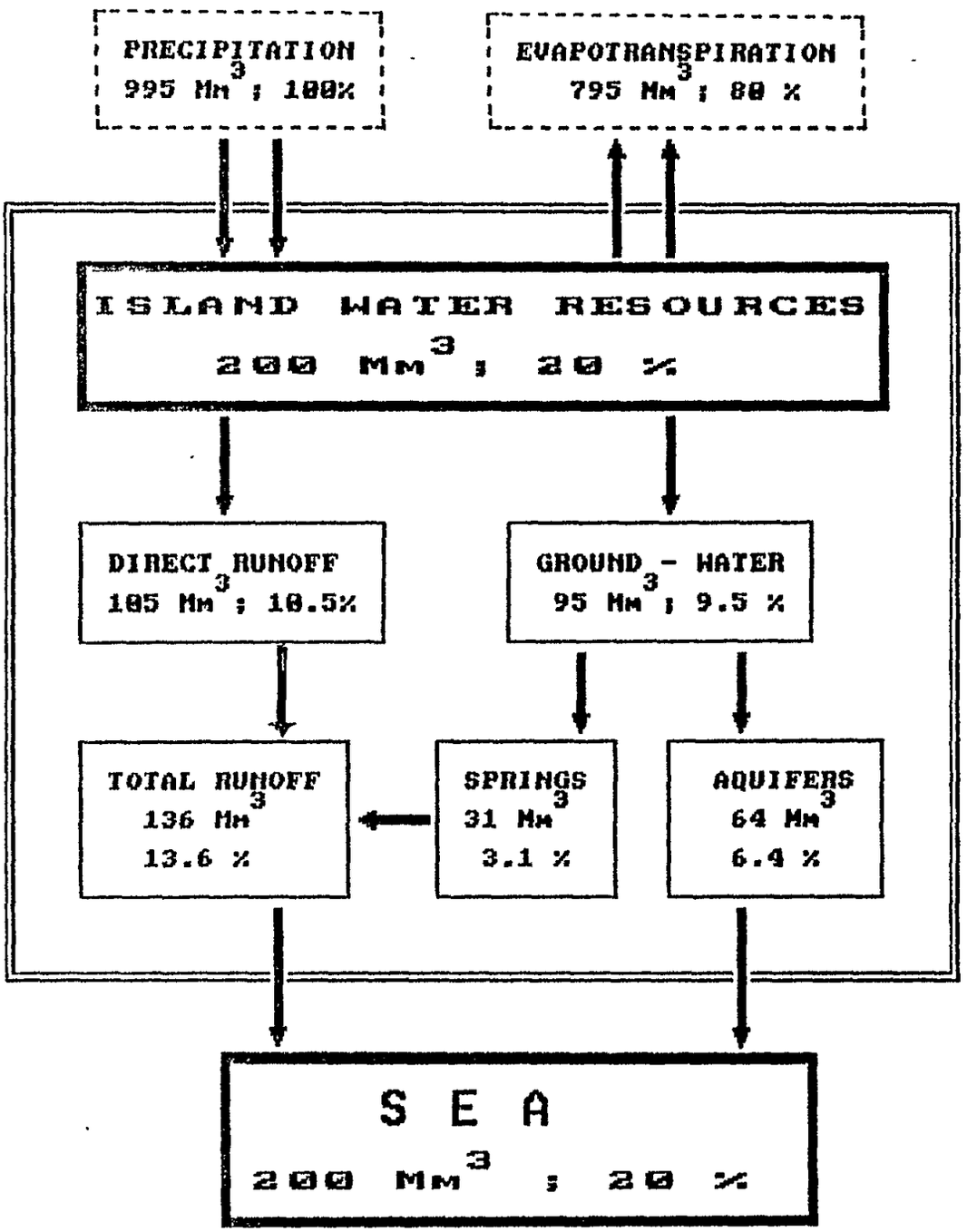


FIGURE C: SEQUENTIAL USE (CONSERVATION)




PRECIPITATION
995 Mm3 ; 100%
EVAPOTRANSPIRATION
795 Mm3 ; 80 %
ISLAND WATER RESOURCES
200 Mm3 ; 20 %
DIRECT RUNOFF
105 Mm3 ; 10.5%
GROUND - WATER
95 Mm3 ; 9.5 %
TOTAL RUNOFF
136 Mm3
13.6 %
SPRINGS
31 Mm3
3.1 %
AQUIFERS
64 Mm3
6.4 %
S E A
200 Mm3 ; 20 %

KIND OF DROUGHT IN THE REGION

* METEOROLOGICAL DROUGHT
* HYDROLOGICAL DROUGHT
* AGRICULTURAL DROUGHT
* SOCIO - ECONOMIC DROUGHT

REASONS

NON NATURAL (technical, finacial, political)

* INADEQUATE PLANNING
* LACK OF FINANCIAL MEANS
* INSUFFICIENT AND INADEQUATE PERSONEL
* IMPROPER ORGANIZATION

NATUARAL (ecological)

* CLIMATOLOGICAL
* GEOLOGICAL, ETC.

interested areas

* ECOLOGICAL
* ECONOMIC
* POLITICAL

DROUGHT WATER MANAGEMENT

* SHORTAGE OF WATER IS MAINLY THE RESULT OF:

  - HIGH DEMAND AS RESULT OF:

    . increasing human population
    . technological advancement
    . increasing standard of living
    . development, especially tourism

  - INSUFFICIENT CAPACITY OF WATER RESOURCES

  - CHANGING ENVIRONMENT

    . pollution
    . devastation
    . changing hydrologicala conditions

* IT IS A COMPLEX PROBLEM:

  - NATURAL

  - SOCIO-ECONOMIC-

* DROUGH MANAGEMENT IS A DIFFICULT TASK WHICH INCLUDES ISSUES:

  - COMPRENHENSIVE WATER MANAGEMENT
  - ECOSYSTEMIC INTERDEPENDENCIES
  - RISK-BASED MANAGEMENT APPROACHES

FIGURE A: THE GLOBAL WATER CYCLE

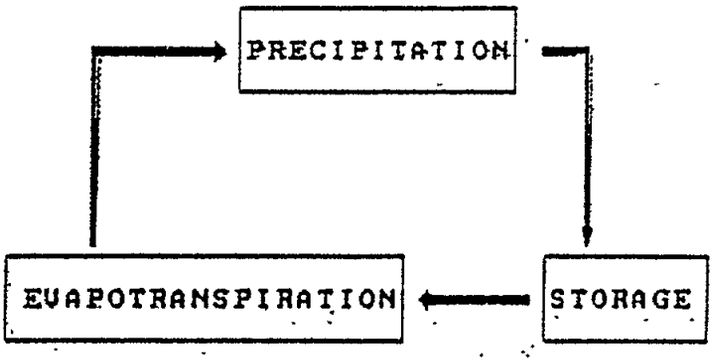
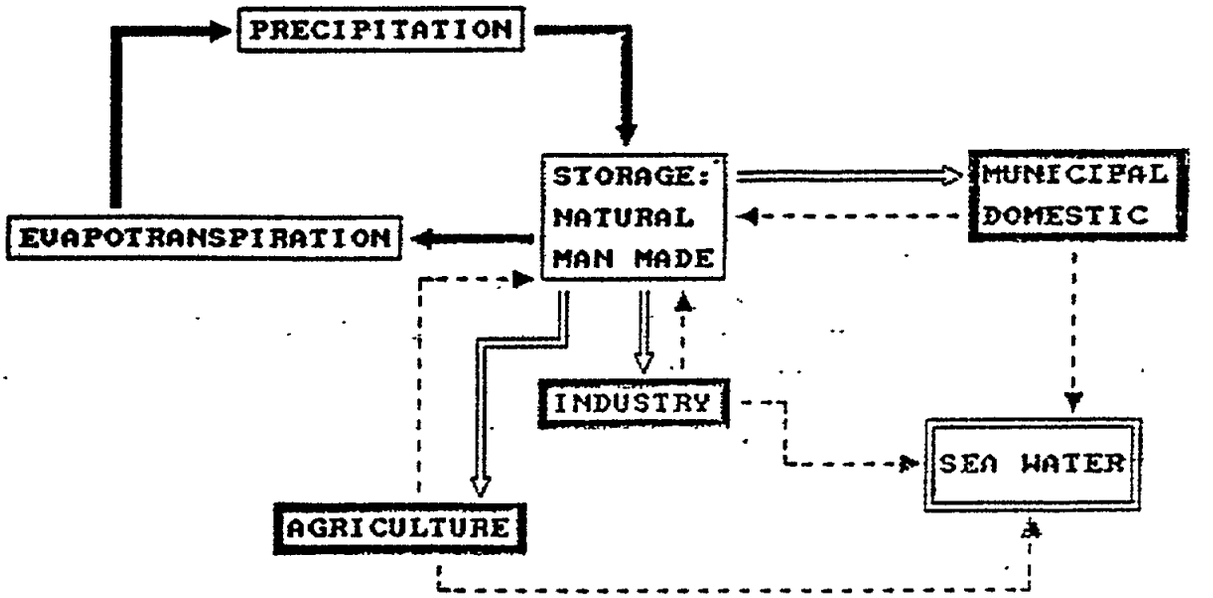


FIGURE B: LOCALIZED WATER CYCLE



PRIORITY ACTIONS PROGRAMME

CONTENTS OF THE DATABASE FOR "THE ISLAND OF RHODES"

TOURIST CAPACITIES
BIOLOGICAL TREATMENT PLANTS
COMMUNITY DEVELOPMENT ASSOCIATION
DAMS
DECREE AREAS
DRILLS
GENERAL MASTER PLAN LIMITS
GEOLOGY
SENSITIVE AREAS
BURNT AREAS
LAND COVER
ROAD NETWORK
SANDY BEACHES
SHORE LINE
SOLID WASTE DISPOSAL SITES
STREAMS
SHORE
TOWNS
WATERSHED AREAS
WINDS

PRIORITY ACTIONS PROGRAMME

MEMBERS OF THE CORE LOCAL GIS TEAM:

-Mr.Nicos Zarifis, Head of the local GIS team,Architect
(Office of the Medieval Town in the Municipality of Rhodes);

-Mr.Vasilis Kyriatsoulis, Civil Engineer
(Dept. of Technical Services in the Prefecture of Dodecanese);

-Mr.Farmakidis Nicos, Surveying Engineer
(Directory of Housing in the Prefecture of Dodecanese);

-Ms.Thespena Kourtis-Laoudikos, Civil Engineer
(Rhodes Municipal Water and Sewage Board);

-Mr.Tsambikos Bardakas, Electrical Engineer
(Computer Department in the Municipality of Rhodes);

MEMBERS OF THE TEAM WHO HAVE PARTICIPATED IN THE BASIC TRAINING:

-Mr.Panos Veneris, Civil Engineer
(Directory of Housing in the Prefecture of Dodecanese);

-Mr.Pavlos Sirtsakos, Surveying Engineer
(Dept. of Technical Services in the Prefecture of Dodecanese);

-Mr.Anthony Hadzioannou, Technical Engineer
(Dept. of Technical Services in the Municipality of Rhodes);

PRIORITY ACTIONS PROGRAMME

OBJECTIVES OF THE GIS TRAINING PROGRAMME IN CAMP "THE ISLAND OF RHODES"

to install appropriate hardware-software configuration

to implement the initial phase of training for the local GIS team

to create appropriate GIS database capable to supplement the training topics

to provide GIS support of the Integrated Planning Study preparation

to provide GIS support for the preparation of other CAMP activities

PRIORITY ACTIONS PROGRAMME

OUTPUTS OF THE ACTIVITY

trained local GIS team

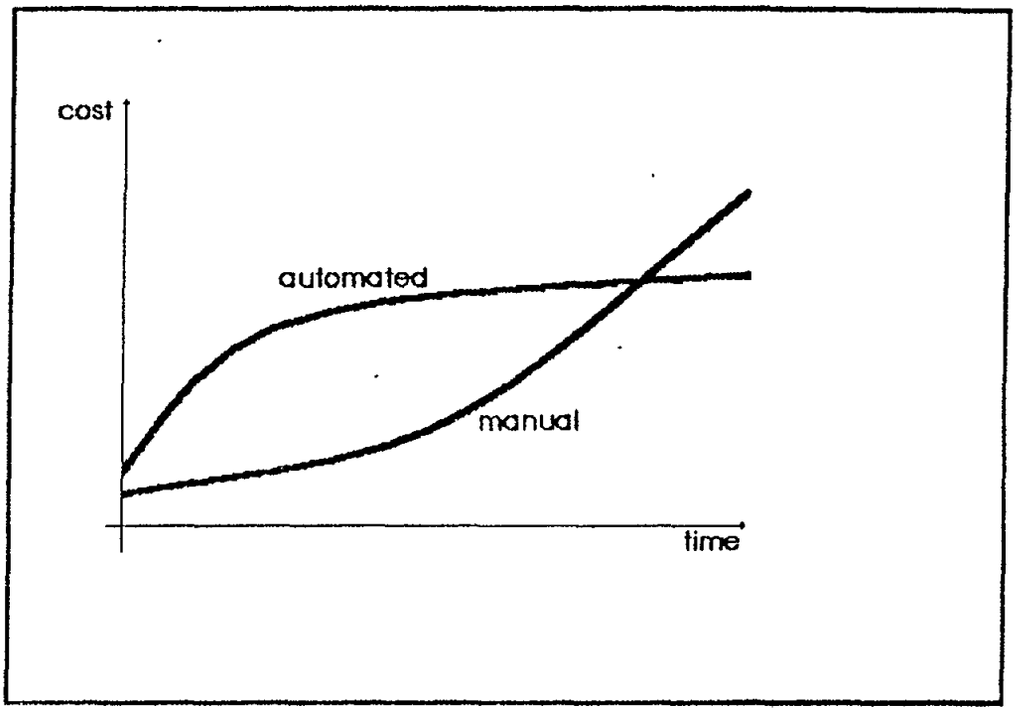
GIS database

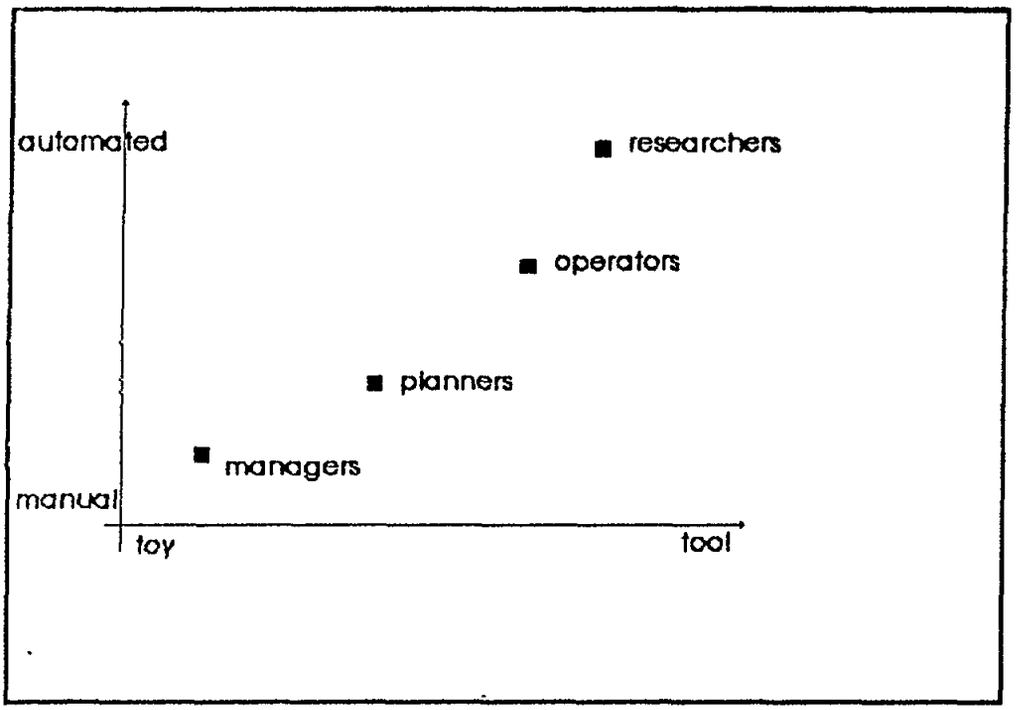
aplications

maps and reports

training documents

PRIORITY ACTIONS PROGRAMME





PRIORITY ACTIONS PROGRAMME

GIS COSTS

data - collection and conversion	70 %
software - system and applications	10 %
personnel - training	10 %
hardware - initial and maintenance	10 %

PRIORITY ACTIONS PROGRAMME

BENEFITS OF A GIS

improved quality of information

greater and faster access to data and information

more efficient information processing

informed decisions

maps, graphics and reports

PRIORITY ACTIONS PROGRAMME

USER INTERFACE FUNCTIONS

choosing database layers and their description

drawing layers with keys and scalebars

zooming in one or more layers at a time defining the window

zooming out one or more layers at a time defining the "window" on another place

identifying attribute data of the indicated spatial element of the layers drawn

simple statistics for all or selected spatial elements

PRIORITY ACTIONS PROGRAMME

STRATEGIES FOR SUCCESSFUL GIS IMPLEMENTATION

strong leadership

clear short and long term planning

pilot study used

realistic, problem oriented applications

dedicated and motivated personnel

stable funding

sufficient schedule

PRIORITY ACTIONS PROGRAMME

TRENDS IN GIS TECHNOLOGY

from technology concerns to institutional concerns

less conceptualization - more doing

demand for standards

from centralized mainframes to decentralized personal computers

problem oriented applications

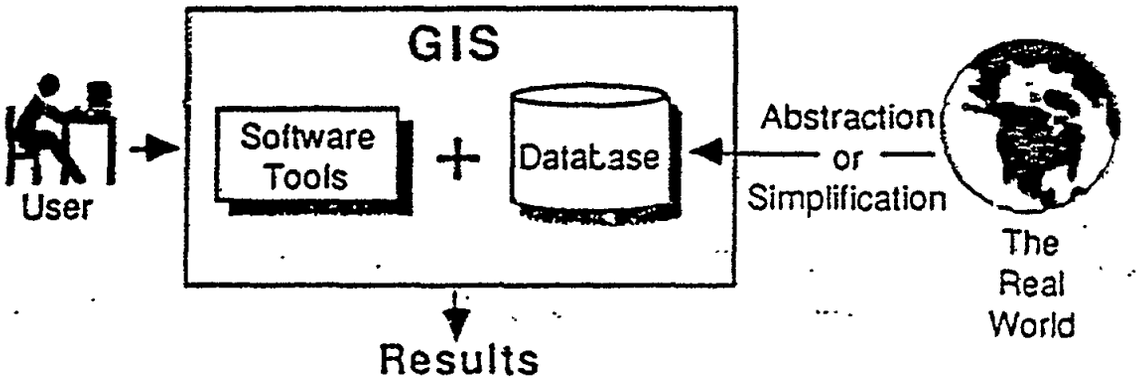
PRIORITY ACTIONS PROGRAMME

GIS (GEOGRAPHICAL INFORMATION SYSTEMS)

DEFINITIONS

a computer system capable of holding and using data describing places on the earth's surface

an organized collection of computer hardware, software, data and personnel designed to efficently capture, store, update, manipulate, analyze and display all forms of geographically referenced data



PRIORITY ACTIONS PROGRAMME

QUESTIONS GIS CAN HELP ANSWER

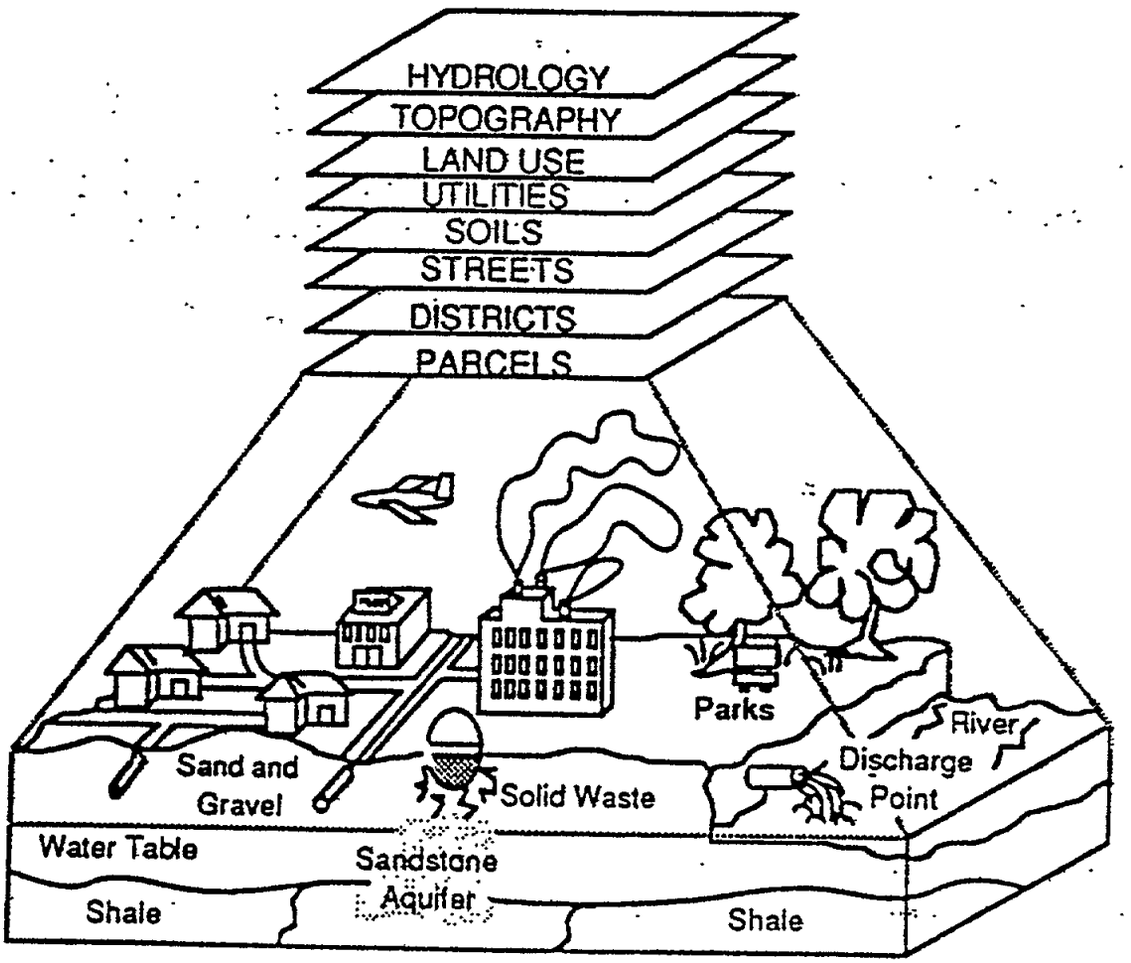
what exists in the real world

how to represent the real world through data and information

how to interpret and explain the whys and hows of the real world situations and relationships

how to predict the outcomes of decisions to intervene in space in local, regional or global level

PRIORITY ACTIONS PROGRAMME



PRIORITY ACTIONS PROGRAMME

RECOMMENDATIONS

GIS institutionalization on municipal, prefectural and national level

- standards
- equipment
- manpower

GIS applications

- planning (integrated and sectorial)
- resource management (coastal zones, water, forests, land etc)
- utilities management (sewage, water, electricity etc)
- risks prevention (forest fires, sea level rise etc)

PRIORITY ACTIONS PROGRAMME

CONCLUSIONS

local GIS team is well trained and ready for future autonomous work.

the applications developed proved to be practical and applicable decision support tool

the contents and quality of the GIS databases were satisfactory basis for applications developed