FOOD AND AGRICULTURE ORGANIZATION
OF THE UNITED NATIONS

UNITED NATIONS
ENVIRONMENT PROGRAMME

A SUGGESTED NATIONAL SOILS POLICY FOR SYRIA

FAO/UNEP PROJECT FP/6101-88-01
Advisory Services to Syria and
Uganda on the Formulation of
National Soils Policies

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For bibliographic reference purposes this document must be referred to as: FAO/UNEP (1992) - Advisory Services to Syria and Uganda on the Formulation of National Soils Policies.

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FOREWORD

Soil degradation types such as erosion, waterlogging, salinization and loss of fertility are widespread in the Syrian Arab Republic. Irrigated areas suffer from spreading waterlogging and salinization. Unprotected slopes on hilly land experience severe water erosion. Wind erosion occurs in the marginal areas under barley cultivation, and in the Badiah where overgrazing is common.

Acknowledging that soil is one of the greatest assets possessed by Syria and that soil loss through degradation and other causes was taking place at an unprecedented rate, the Government of the Syrian Arab Republic entered with UNEP into a technical cooperation project for the formulation and subsequent implementation of a National Soils Policy.

This proposed National Soils Policy for Syria was prepared under UNEP/FAO project FP/6101-88-01, by fielding a multidisciplinary team of local and international experts. The team members consisted of Mr. A. Saliba and Mr, D.G. Wilcox, the international experts, and Dr. E. Jabour, Dr. N. Shybani and Mr. D. Falouh of the Ministry of Agriculture and Agrarian Reform in Syria. The team carried out its work in Syria during July and August 1989. The ready assistance given to the team by the national and international bodies concerned with land use in Syria is greatfully acknowledged.

The Soils Policy suggested in this document is meant to be illustrative rather than exhaustive in character, and by no means a substitute for local experience, foresight or prudence. If properly implemented, the suggested Soils Policy will have a variety of impacts. For instance, it will not only enhance the quality and productivity of soils, but it will also aid the entire development process, promoting the economic well-being of the people of the Syrian Arab Republic. These benefits will be obtained through incorporating the policy in all development plans that touch on or involve soils as the basis of land resources.

I sincerely hope that the Suggested National Soils Policy will meet the practical needs of the Syrian Arab Republic

Sveneld Evteev
Assistant Executive Director
Office of the Environment Programme
United Nations Environment Programme

A DRAFT NATIONAL SOILS POLICY FOR SYRIA

A. SUMMARY

a. The Policy

Soil is a national asset of fundamental importance to Syria. Recognising this, the government wishes to develop policies which will prevent the further degradation of land. Land and soil degradation affects all sectors of society. All the citizens will therefore be involved in a programme which will allow the soil to pass onto future generations in good and improving condition.

The general principles guiding policy development are:

- Land will be maintained so that it may be used for any purpose within its potential in the future.
- The government will promote the best uses for land.
- Land degradation affects all sectors of the economy.
- Land degradation caused by erosion, waterlogging, salinity, and loss of fertility is common in the Syrian Arab Republic.
- The Soil Policy will affect all land users.
- Credits and incentives will be used to promote the Policy.
- Land tenure will be reviewed to promote the Policy.
- Farmers will be encouraged to adopt better practices.
- Public awareness will be raised.
- Land use planning will guide land allocation.
- Urban and industrial spread into good agricultural land will be halted.
- The value of land lost to agriculture or forestry will be accounted for in the assessment of the economics of new land uses.
- Irrigation areas will be managed better.

b. Principal Issues in Syria

Factors affecting land use fall into two classes. There are those land and soil based issues which demonstrate land degradation. There are additionally those institutional and structural elements which affect the type of use which land receives.

The land based problems are:

- Waterlogging and salinity in irrigated areas.
- Falling watertables in areas exploited for groundwater.
- Water erosion on hilly land and on long, unprotected slopes.
- Wind erosion occurs in the marinal areas and in the Badiah where land has been cultivated for barley production.
- Overgrazing in the Badiah has adversely affected its production.
- Pollution of agricultural land occurs round some chemical plants and oil refineries.

The institutional problems are:

- An inappropriate use of the agricultural zoning systems for crop allocation.
- Incorrect land use resulting from this may lead to poor land management practices and it limits flexibility.
- There is weak coordination between ministries and authorities responsible for land use, for example between the Ministry of Agriculture and Agrarian Reform (MAAR) and the Euphrates Authority.
- Unviable farm size may lead to over-exploitation of land.
- The agricultural extension service requires strengthening particularly in soil and land conservation, in communication skills and in technical matters.
- Agricultural research lacks the multidisciplinary approach required to solve land management problems.
- Water for irrigation is not economically priced. It has been wasted till now and has contributed to waterlogging and salinity. This problem is being addressed by government now.
- Forestry merits better than the label of the use of last resort since it can reduce soil erosion. Agro-forestry should be encouraged and steep lands for forestry rather than for agriculture.

c. <u>Strategies and Tactics to be Employed in Support of the National Soils Policy</u>

1. The encouragement of better land use through:

- The establishment of a land capability evaluation group within a new General Directorate of Soil Research in the MAAR. Its

charter would include the responsibility to gather data such as the inventory of the soil and land resources and the identification of the constraints to different forms of land use. The group would also prepare maps showing the distribution of existing land use and of potential land use for each of the mapping units delineated.

- The consolidation of fragmented and unviable properties.

- An examination of pricing structures to develop those favouring land conservation.

- The initiation of multidisciplinary research and demonstration to persuade farmers to adopt better land care practices.

2. The encouragement of public participation:

- The government will undertake a programme to raise the level of public awareness to land conservation issues.

- Education in land conservation will be directed at children and adults and at all sectors of the community.

- Land user groups with an interest in land conservation will be encouraged.

- Local leaders in land and soil conservation will receive special training.

3. National institutions will receive special attention:

- A General Directorate for Soil Research will be established in the MAAR. It must be consulted by all sectors of government when changes to land use are proposed. The Directorate will establish a land condition monitoring network and will report annually on condition changes. The Directorate will have an agricultural wing and a general land use wing;

- The government will establish an Agricultural Research Group to coordinate and promote multidisciplinary research between and within Ministries and Authorities. It will identify the institutions which can undertake research cooperatively and will create a dialogue with the Consultative Group for International Agricultural Research. It will take advice from the Higher Planning Council and the Higher Agricultural Council on the type of research to be undertaken. It will identify training needs.

- The government will introduce comprehensive soil and land conservation legislation which crosses sectoral boundaries. It will also introduce Land Use Planning Legislation.

4. An outline of the actions which the government should take in respect of the above strategies is included.

d. Recommendations for Follow Up

The following projects are worthy of international support since they are directed primarily at assisting the development of the National Soils Policy:

- Establishment of a land resources evaluation group including GIS capability and the development of a pilot project to complete a land resource analysis for Hassakeh province. This would be extended to other provinces later.

- Development of an "expert system" to integrate the social, economic and technical aspects of the Badiah problem in an attempt to solve this complex issue. "Expert systems" use computers to make models which integrate all the available information about social, economic and technical processes. These processes together are the Badiah system. The analysis of the model identifies which parts of the whole system have the most influence. For instance it may show that social pressures and the tenure system are more important factors than technical solutions such as reseeding or erosion control. They should therefore receive priority treatment, this being preferable to technical solutions.

- Carry out studies into the origin of wind erosion problems and to carry out some control works.

- Carry out water erosion and flood control works including water harvesting in a selected wadi.

- Bolstering of the extension service with technical support units.

- Development of appropriate methodologies for the installation of part of two land condition monitoring networks one in grazing and the other in cereal lands.

D. A SUGGESTED DRAFT NATIONAL SOILS POLICY FOR THE SYRIAN ARAB REPUBLIC

1. INTRODUCTION

Land is a national resource of fundamental importance . It is basic to every human need. It is not the property of those now living but that of all the past generations that have worked upon it and of all the future ones that shall work upon it.

Recognising that the future of the nation depends upon the quality of its land resources of soil, water, plants and animals, the Government of the Syrian Arab Republic (SAR) adopts the principles set down in this policy document as the guidelines for the future use and management of this most fragile of resources.

Acknowledging that its prime function is to improve the wellbeing of its citizens, securing for them an abundant food supply and improving the quality of their life the Government sees the degradation and destruction of its soil resources as processes which must be reversed by timely and appropriate actions. It will use its every endeavour to ensure that the present use of land will be compatible with its potential and that use permitted today will not prevent that land being used for other purposes by future generations.

Soil is one of greatest assets possessed by Syria. It is a living and dynamic medium supporting animal and plant life. It is vital to the survival of the nation, for its food and its raw materials. It is a part of the biosphere in which human beings are also enmeshed. They cannot survive outside it.

The continuously increasing demands being placed upon the soil resources of the nation to feed, clothe and house its citizens enjoins the Government of the SAR to adopt this policy as a matter of the highest priority so that it may leave an acceptable legacy to future generations.

Recognising the general objective of responsible stewardship for its soil resources, the Government of the SAR will institute a number of programmes aimed at achieving its long-term goals. The essence of these is found within the principles which will define the guidelines for public and private actions in the care for soil and land resources.

In establishing these principles the Government of the SAR recognises that land and soil degradation affect not only agriculture and forestry, but other sections of the economy including the manufacturing and commercial sectors. The Policy will bring together government ministries and instrumentalities with land users in a productive partnership ensuring the enhancement of productivity and the halting of the processes of degradation.

2. PRINCIPLES OF THE NATIONAL SOILS POLICY

The driving principle of the Soils Policy will be to ensure that use of the land and soil does not degrade or destroy these fragile natural

resources. Only 15 percent of the land in the SAR receives more than 350 mm of rainfall. It is vital that this land and its companion irrigated land retain its potential and that production from it is enhanced. National goals in agriculture and forestry will be consistent with the capacity of the land.

High priority will be given to the promotion of optimum land use, to the maintenance and the improvement of soil productivity and to the conservation of soil resources.

Land degradation is recognised as any process which diminishes the capacity of the land and soil to produce at its potential. Wind and water erosion, water logging, salinity, deterioration of important soil properties such as structure and infiltration rate, loss of soil fertility and pollution are all conspicuous problems in the SAR and are highlighted in the Plan of Action to combat desertification in Syria. The Policy aims at addressing these destructive processes.

The agricultural and forestry sectors are not the only parts of the economy affected by land degradation. It can have adverse effects on other sectors such as siltation of dams which in turn affects the production of energy. The Soils Policy is thus a part of the government's broad programme for social and economic progress.

The government will involve land users in all stages of the implementation of its Soils Policy so that the best possible use is made of land. The knowledge that land users can bring to the resolution of specific soil problems will thus be employed in the creation of provincial and national programmes. The institutional structure which provides for consultation with farmers will be elaborated to include representatives of land users.

Credit and marketing supports and farm incentives will be applied in such a way that they promote the adoption by farmers of land use practices which are consistent with the objectives of sound soil management. Support will not be made available on a pan-territorial basis, but will be tailored to the conservation needs of each province and each agricultural industry.

The legislative framework and institutional structures of the nation will be kept under review and augmented when necessary so that they become the instruments of sound soil management in the SAR.

Land tenure provisions will ensure that farmers can gain a good living from their land and will not be compelled by lack of area to force the land to produce beyond its optimum potential in order that they may survive. The Government of the SAR will review the tendency to land fragmentation and will institute controls that prohibit the creation of lots of land of ever-diminishing size.

Farmers will be given the support and encouragement which will stimulate a proper concern for the land. Land conservation techniques, grazing management practices and appropriate farming systems will be promoted and demonstrated by the agencies of the government responsible for

these matters in agricultural, grazing and forestry land. The government will ensure that its institutions are staffed with adequately trained personnel and funded to the level made necessary by the programme of soil resource conservation.

As land conservation is a national issue of prime importance to the nation and to its future, the Government of SAR will undertake a campaign of public awareness reaching all citizens. It will stress the need to conserve the soil resources of Syria and the concern which all sectors of the economy should have for this basis of the wealth of the country. An educational programme embracing school children and adults will be a continuing component of the government's actions towards the conservation of its soil resources. Teachers and the mass media will be involved in keeping the spirit of land conservation continuously to the fore.

Proper and appropriate land use is recognized as the basis of sound soil management. The Government of the SAR will evaluate the potentials of and constraints applying to all of its soil resources. Land use recommendations and agricultural, grazing and forestry practices will always be in accord with the potential described by the land classification and land evaluation programme. Effective land use planning thus undertaken will permit the establishment of genuine policies for the conservation and improvement of the soil resources of the nation. The government will install a network of land condition monitoring sites with which it will gauge the effectiveness of its policies.

As prime agricultural land is a scarce resource in Syria, the government will plan development so that little agricultural land is lost to industrial and town development. The use of land for non-agricultural purposes will be organised to avoid the occupation or permanent degradation of good quality land.

If development proposals adversely affect existing land use or are likely to cause land degradation, the cost to the community of the loss or damage will be included in the assessment of the benefits of the proposal.

Technical, economic and social studies will be required in the planning of all land development and irrigation programmes. As such, development is part of the government's plans for promoting the social and economic welfare of the country - it is essential that an integrated approach is adopted in planning. This requirement calls for greater collaboration and cooperation between ministries and the creation of institutional mechanisms which will permit a free and rapid flow of information.

Soil degradation can develop in irrigated areas as a result of poor water management. Irrigation projects will be designed and managed so that the land does not deteriorate through salinity and waterlogging.

3. SOIL POLICY ISSUES IN SYRIA

3.1 Introduction

The Soils Policy mission was able to identify a number of soil and land conservation issues, matters of concern in water use and water

management and a number of institutional constraints which separately and together lead to poor land use practices and to land degradation. It was possible to separate areas of regional concern from those of a general and national character. Each of the land use problems is dealt with in the following sections. The analysis provides a basis for discussion of the strategies which are available.

3.2 Land and Soil Based Problems

3.2.1 Salinity and waterlogging

A substantial proportion of the 600 000 ha. of irrigated land in Syria is affected by salinity and waterlogging.

Definition: Salinity and waterlogging are problems which are very closely related to one another. Salinity in irrigated areas is a product of the application of excessive amounts of irrigation water, high evaporation in hot, dry summers leaving residual salt, and a rising watertable. An accumulation of salts in the root zone of plants is the result. Crop production is either prevented entirely or at best severely restricted. Waterlogging is a flooding of the root zone of the plants which prevents their growth.

Location: Salinity occurs in the irrigated lands of the Euphrates basin, along the lower plains of the Euphrates river and on those plains irrigated from the Khabur river. It also occurs in the Ghab valley. Waterlogging is most common in the Ghab.

Causes:

- excessive water application,
- inadequate drainage,
- badly maintained drainage systems,
- leaking supply ditches,
- poor quality water,
- poor irrigation technique,
- fragmentation of holdings.

Dangers: Excellent land becomes unproductive. Overall production from irrigated areas falls.

Solutions:

- increased water use efficiency,
- better irrigation techniques,
- better drainage and supply design,
- better maintenance of systems,
- leaching and drainage of salt-affected areas,
- introduction of salt tolerant crops,
- improved cultural practices e.g. furrow rather than basin irrigation.

The problems of gypsiferous soils in the Euphrates Basin are those of a technical nature. They are not derived from unsuitable technologies, but are rather inherent in the soils being irrigated. The dispersion of

the problem soils throughout the irrigated area makes the resolution of this problem of high priority for the government.

3.2.2 Groundwater and falling watertables

Groundwater is used as the foundation of fruit tree planting programmes in reclaimed areas in the south in Qunaytra and Dera'a. It is also the basis of many agricultural projects in the north particularly in Aleppo province and is important in the coastal provinces as a source of supplemental irrigation, as well as in the eastern provinces such as Hassaka.

In the very dry areas, groundwater reserves are being used to establish foci for intensive agricultural production. Groundwater is clearly an extremely important resource in the development of a sound agricultural base for the country. It should be well husbanded and not overused.

Definition: Falling groundwater watertables are caused by an overuse of the resource. Depletion of this resource will adversely affect production of some crops and lead to land degradation. This problem should be tackled now before it becomes serious.

Location: Wherever groundwater, as distinct from dammed or river water, is used for irrigation.

Causes:

- insufficient knowledge of groundwater reserves, particularly of catchment size, annual replenishment of reserves and safe draw on a local basis,
- unlicensed bores and unrestrained use of bores,
- inadequate regulation of use.

Dangers: Depletion of the groundwater will cause many agriculture ventures to fail. Land used for these may be unsuitable for other forms of production.

Solutions:

- intense studies of local groundwater resources to identify safe yield,
- control of the use of groundwater,
- monitoring of water levels on a continuing basis.

3.2.3 Water erosion

Water erosion is a common problem in Syria and had led to the degradation of much valuable land.

Definition: Water erosion occurs primarily when land is exposed to the damaging action of rain and wind. Soil is lost in three ways. Sheet

erosion takes place when the whole surface of a field is gradually eroded in a more or less uniform way. Rill erosion occurs when miniature gullies are formed on the land. It may occur on steep land as well as on more gentle slopes. Gully erosion occurs on land when water running downhill cuts a deep channel into the soil.

Location: Water erosion is most severe in the hilly and mountainous country of Syria. It is less severe, but more widespread in the Badiah.

Causes:

- overuse of land and use of land beyond its capacity,
- lack of water controls on land - no contour banks or structures,
- the practising of agriculture on slopes not suited to it,
- removal of forests and other cover which normally protects the surface of the soil,
- overgrazing and removal of vegetation, by stock,
- use of land particularly prone to this form of degradation e.g. Marls near Safita,
- habitual use of incorrect cultural practices e.g. ploughing along the slope.

Dangers:

- loss of soil, a fundamental asset together with the nutrients it contains,
- loss of production from the land,
- land is rendered useless.

Solutions:

- use of land within its capacity and reallocation of land to match its capability,
- erection of water control structures,
- maintenance of groundcover,
- reforestation,
- use of the right control practices.

3.2.4 Wind erosion

Most Syrian soils are well structured and are not susceptible to wind erosion. However, the continued and intense overuse of these excellent soils may lead to structural breakdown and finally to wind erosion. The dust haze surrounding Damascus is cited as evidence of an incipient breakdown.

Definition: Wind erosion occurs when the surface of the soil is unprotected by natural roughness such as vegetation or stone mantles. It is more common in lighter soils, but may occur in well structured soils which are abused.

In the lighter soils of the east part of the country wind erosion, causing sand hummocks and sand drifts, is a serious problem. There is some

evidence of low dune formation. Pedestalling around obstacles such as low shrub remanents is common.

Location: The Badiah of Deir-Ez-Zor, Hama, Rakkah, Damascus and Hassakeh provinces.

Causes:

- overgrazing,
- ploughing for catch cropping. This destroys the inherent stability of the soil,
- poor land management practices,
- deforestation.

Dangers: Endangers cultivated areas of the Euphrates Valley affecting villages, burying houses beneath drifts and covering roads and railways. It can affect air traffic and is a danger to highly developed equipment. Adversely affects production from rangeland and destroys seedlings of rangeland plants. Adversely affects the quality of life of inhabitants.

Solutions:

- priority should be given to the central part of the Badiah,
- legal measures to stop all unwise cultivation practices,
- examination of the problem in order to identify the source,
- stop grazing in the most fragile areas and create protected areas,
- cessation of all ploughing in the Badiah and marginal lands,
- when control is achieved then reseed and revegetate.

3.2.5 Degradation of natural rangelands

Natural rangelands occur throughout Syria, but the most important are those contained in the Badiah region and in the marginal parts of stabilisation Zone 4. It is an area of great importance since the bulk of the sheep in Syria are grazed there. Badiah rangelands are seriously degraded and eroded.

Definition: Rangelands are degraded when the natural productive cover is removed and replaced by unpalatable or ephemeral plants. The reduction of cover also lays the land open to erosion. Consequently extensive tracts become affected by water and wind erosion. Degraded rangelands have neither the production nor the stability which characterises rangelands in good condition.

Location: The Badiah problem occurs in all those provinces where rangeland grazing land is present.

Causes: Overgrazing, ploughing for catch cropping, excessive stock numbers, over population, common grazing tenure, supplemental grain feeding, social and historical factors and lack of user responsibility for land.

Dangers: Severe degradation in the Badiah is a recent phenomenon though it probably has been heavily used for centuries. The continuing and rapid deterioration of the land is a most serious problem since it will

immediately affect milk, meat and wool production. There is an urgent need to address the problem.

Solutions: The Badiah problem is very complex. It has social and historical components combined with tenure systems. There are economic pressures compelling farmers to carry more animals than the land can support and this overgrazing is made more severe since there are increasing number of people engaged in sheep grazing. The biological problems arise out of these factors. Technical solutions to the Badiah problem are available. They will probably be ineffective unless the social and economic factors are also investigated and incorporated into an overall programme.

The use of "expert system" to resolve the issues and to select those most amenable to change is recommended.

3.2.6 Pollution

Areas of valuable agricultural land are becoming polluted by industrial wastes from chemical plants and oil refineries near Homs. It is a potential problem in other areas.

Definition: Permanent or temporary destruction of the potential of land through poor waste disposal from industrial plants.

Location: Principally near Homs.

Causes: Discharge of solid, liquid and gaseous wastes from industrial plants without concern for disposal techniques.

Dangers: Renders land unproductive and is the cause of human health problems.

Solutions: Better compliance with accepted norms for waste disposal.

3.2.7 Urban and industrial expansion

Definition: Urban expansion has the capacity to diminish significantly the amount of first class agricultural land around major towns. The expansion of housing and industry obliterates the land so affected. Roads and associated infrastructure contribute further to the loss.

Location: Near all major towns, but most common near Damascus and Aleppo.

Causes: Urban spread from Damascus onto the Reef (the Ghouta) is an excellent example of the adverse effects of uncontrolled spread and inadequate planning. Housing development and other non-agricultural uses should be directed towards lands of little productive potential. Lack of effective regional and town planning is the principal cause.

Danger: The primary danger is loss of good agricultural land to uses which effectively preclude agricultural production at any time in the future.

Solution: The development of statutory regional and town planning schemes which prescribe the types of land use which may be pursued in each section of the scheme area.

3.3 Institutional and Legal Problems Contributing to Poor Land Use

3.3.1 Introduction

This section is given over to a discussion of the problems engendered by some of the internal administrative policies developed by the Government of the SAR. In no way should the comments be taken as a criticism of existing policies which have been established to serve the needs of the Republic particularly as it embarked on the revolutionary changes necessary in society. It is intended rather to suggest areas in which policies may be modified, coordination and cooperation links strengthened and some structural changes made in the interest of promoting the National Soils Policy and securing its successful implementation.

3.2.2 Agricultural settlement zones

The subdivision of the Republic into agricultural settlement zones based upon rainfall is a cornerstone of agricultural planning. It determines the range of crops which may be grown in a zone and is so pervasive that it affects crop licensing, agricultural credits, agricultural incentives and the national agricultural goal of self-sufficiency in food production. Deficiencies inherent in its application have an influence on the price support and pricing policies for agricultural production.

Although useful as a first approximation for agricultural production, the present coarse sub-division of the land resources ignores other highly important factors which determine success or failure in agriculture. Rainfall is admittedly an important driving variable. Its effect is continually modified, however, in certain cases critically, by other factors such as soil type, soil depth, soil fertility, annual temperature regime, aspect, slope, elevation and wind to name some of the influences which work upon the land and its agricultural potential. Maximizing agricultural productivity depends upon a consideration of all these factors. When rainfall alone is used as the criterion for crop selection, the choice must be imperfect and below the optimum in most cases.

The reliance which is placed on the zoning system is further brought into question when it is realized that the position of zone boundaries within provinces is influenced considerably by demography rather than by rainfall records alone. Further, the length of rainfall record used to locate the boundaries between the zones is inadequate since it does not provide for the extremes of rainfall received.

Agricultural zoning as practised therefore does not permit the flexibility required in agriculture in a low rainfall environment. In some

instances it restricts certain farmers to a range of crops unsuited to environment constraints of the land. In others the crops proposed or selected may not be consistent with land conservation objectives. In short the agricultural zoning system places a severe constraint on the achievement of agricultural self-sufficiency through its selection of inappropriate goals for the farming community.

The allocation of land to crop types by land capability evaluation is the alternative to the current system of agricultural zoning since it takes into account all aspects of the agricultural environment and offers the capacity to select the crop most suited to each land parcel. A discussion of land capability is found later in this document.

3.3.3 The agricultural licensing system

Some attention might be given to allowing farmers more flexibility of action within the licensing system provided that the necessary controls over abuses of land management practices can be exercised. Freedom to respond more freely to market forces may assist in the pursuit of self-sufficiency in food while promoting proper land care.

3.3.4 Coordination between ministries and authorities and the planning process

There are weak links between ministries and authorities responsible for the use of the land resources of the SAR. The poor coordination between, for example, the Euphrates Irrigation Authority and the Ministry of Agriculture has contributed to some of the land use problems in this irrigation area. The use of water, its distribution and allocation and the relationship to crop demand being one example. Lack of continuous and effective contact has, in this case, been a contributing factor to the creation of salinity, waterlogging and drainage problems.

Weak coordination between ministries and within ministries has led to the development of legislation and regulation which can have conflicting aims, such that the objectives of land conservation and soil protection are ignored.

The basic reason for the weak liaison between ministries and authorities is that no group or directorate within the government service can be recognized as a prime source of information on land, its qualities and constraints to various forms of use. At present no ministry is charged

with acquiring this information and with making it available. Decisions on land use are therefore made with imperfect information. They are thus frequently not made in the interests of land conservation.

The importance of high quality information on land and its attributes does not appear to have been considered for there is no requirement for consultation on land alternatives in the planning of development. Planning in the absence of information on land qualities is frequently inimical to soil and land protection. Furthermore, it is difficult to see how the National Agricultural Council can establish goals in the planning for self-sufficiency without access to land information of good quality.

3.3.5 Farm size and farm fragmentation

The agrarian reform laws brought in by government in 1958, and subsequently, defined the maximum area of land ownership according to region and type of agriculture practised. Government has been highly successful in its efforts to make land available to farmers who were formerly the tenants of large estates. Tenure changes and inheritance provisions have, however, created a problem of small and fragmented farms which can only worsen. Although average farm size is about ten ha., eighty percent of holdings are now below the average and one-third are below two ha. The average holding now consists of 4.5 separate plots of land and even holdings of two hectares now average 3.1 individual plots.

The subdivision and fragmentation of land have three important consequences to land and soil conservation and the pursuit of agricultural production targets. Small and economically unviable holdings will eventually force farmers to extract more than the sustainable production from the land if they are to survive. Land treated in such a fashion will ultimately deteriorate. Small farms in irrigation areas are by definition difficult to drain because of the complexity of the holdings. The task of supplying water in a coherent and logical fashion to such farms is almost impossible. This results in the overuse of water and leads to salinity and waterlogging.

Finally, the disaggregation of farm units hampers the introduction of farm mechanisation and the efficiencies its adoption would imply.

In the long-term interests of land conservation and food production the Government of the SAR should continue actively to address the question of minimum farm size in each farming sector.

3.3.6 The agricultural extension service

The Ministry of Agriculture has been able, under a bilateral aid project, to establish 600 extension posts throughout the agricultural zones. They are staffed with agricultural engineering graduates from universities in Syria.

By general admission the extension service does not appear relevant to the farming community and does not appear capable of promoting those land management practices which are in the best interests of land conservation and sustainable production.

There are many sources for this seeming inability to fulfill the obligations of its charter. These include a lack of career path for extension officers, no financial or other incentives to attract officers to difficult posts, little financial support, a lamentable dearth of facilities, inadequate training both prior to employment and during service and an uncertain relationship with prime sources of information on farming practices and animal husbandry.

The extension service is the linch-pin organisation in progress towards land conservation, soil protection and agricultural self-sufficiency. It is also the interface between agricultural research and agricultural practice. It is the principal medium through which farmers learn of better practices and better varieties. In its present condition the extension service is unable to catalyse change or to promote the drive towards greater production. A consideration of this dilemma for the government is found later in this report.

3.3.7 Agricultural research

The responsibility for the conduct of agricultural research is entrusted primarily to Directorates in the MAAR and is carried out by the Directorate of Soils and other directorates as appropriate. In addition, international research organisations such as ICARDA and ACSAD carry out research programmes in specific areas. United Nations agencies undertake research as part of arrangements entered into with the government. Such research is usually project orientated and limited therefore in its application to the country as a whole.

There are two areas of concern in respect of the agricultural research programme. The first is that of research within the Ministry itself. Although carried out responsibly and diligently the Ministry is hampered by a lack both of trained research personnel and of facilities. As a consequence, it is unable to carry out the agricultural systems and practices research which is basic to the development of land conservation in the Republic. It is able to carry out soil fertility studies, to test varieties and similar work, but does not have the capacity to carry out integrated systems research. This would require the formation of multi-disciplinary research teams to investigate management and land use in the various agro-ecological zones of the country. At present the directorates who would supply personnel to these teams tend to be disaggregated and with separate terms of reference. The preparation of a unifying corporate plan for the Directorates of the Ministry would clarify objectives more clearly and create the opportunities for rewarding collaborative effort.

The work of ICARDA and ACSAD is of world class and can stand any critical inspection. However, the field implementation of the results of their work by Syrian authorities seems to be weak.

While the technical issues have been addressed by the international research workers some significant barriers to adoption are embedded in the social and economic fabric of the agricultural community. A resolution of the impasse could arise from a major socio-economic survey of land ownership and of farmers attitudes to the new technologies.

The research capacities of ICARDA, ACSAD and UN organisations such as FAO do not appear to have been exploited by the government. The organisations seem to operate outside the work of the Ministry although some limited cooperative work is undertaken.

Discussions with research personnel in both national and international organisations revealed that there is a large body of information which can be used to address the issues in the use of land which have been raised in this document. No attempts have been made to incorporate this information into "expert systems" which attempt to mimic the field situation.

3.3.8 Price supports and range deterioration

Overuse of the Badiah is encouraged by the pricing policies for meat and for feed barley. The low price of barley for feed purposes encourages the retention of more sheep in the Badiah than should be supported there given its low rainfall and current degradation. The practice causes further land degradation and the loss of animal unit carrying capacity. The price relationships should therefore be adjusted or the allocation of feed barley to the Badiah reconsidered.

3.3.9 Price fixing, incentives, subsidies and water pricing

Three issues are of concern here. Firstly, price supports for specified crops are established on the basis of a perceived need for the particular commodity. Incentives to production are allocated similarly. For reasons given in Section 3.3.2 the price supports incentives and subsidies may, in fact, be supporting agricultural production systems which are inconsistent with land conservation. It is important therefore that the financial support system be linked intimately with the land capability evaluation which will be recommended in this document.

Secondly, the fixing of "farmgate" prices for agricultural commodities may, when the price is pitched too low, force farmers to extract more than is possible from the land. Its condition then suffers. Farmers may, for instance, be forced to abandon land rotations in an effort to produce sufficient to remain economically viable.

Finally, many of the problems in irrigated lands have arisen as a result of the wasteful use of water by farmers. Water is not priced economically. Until it is, waste will continue and with it the associated problems of waterlogging and salinity.

3.3.10 Place of forestry

Syria has embarked upon a courageous plan of re-forestation including its "green belt" policy and the establishment of large roadside vegetation ribbons.

Forestry in upland and rocky areas is not given adequate recognition as an important potential use of land. Forestry is very often the last resort for land for which no other immediate use can be found. As a consequence useful forestry land is given over to hazardous production systems and not necessarily to the best land use.

The land capability evaluation as discussed later in this document has the capacity to allocate land in the best interest of land conservation.

4. STRATEGIES AND TACTICS IN SUPPORT OF THE NATIONAL SOILS POLICY

The National Soils Policy will be supported by national action in three areas. These are:

1. Encouragement of better land use.

2. Public participation in land conservation.

3. The formation of national organisations to promote the National Soils Policy.

The strategies will be the antithesis of those forces which lead to land degradation. Accordingly, they will be designed to:

i. prevent the deterioration of the rangelands of Syria;
ii. prevent the degradation of agricultural lands;
iii. prevent waterlogging and salinisation;
iv. promote re-forestation
v. obstruct the forces creating wind erosion and water erosion and to combat their effects where necessary.
vi. prevent a decline in the availability and quality of water supplies

Since the processes of land degradation are insidious and probably imperceptible on a year-to-year basis it is important that these strategies should be developed in order that the decline towards severe degradation may be halted.

4.1 The Encouragement of Better Land Use

Actions which will be taken under this heading include a mix of data gathering and analysis, planning, research and extension programmes and adjustments to policies which affect directly agricultural production, land conservation and soil protection.

4.1.1 Land capability evaluation

The role of the agricultural zoning system in the allocation of land use and the potential it has for the development of production plans contrary to the best land conservation practices which have been discussed in Section 3.3.2. An alternative land allocation system based on the capability of the land is therefore proposed. Reliable data on the land resources of the nation including its soil, vegetation and climate are needed if sound land use policies and realistic conservation policies are to be developed.

Data on the land resources are first accumulated in a data base in order that a land suitability evaluation may be carried out. This is the process of assessing the suitability of land for specified kinds of use. There may be many kinds of use for land. The land capability evaluation

assesses the suitability of the land for that kind of use and classifies each kind of use in terms of hazards which may occur with the use. It is able to specify the conservation techniques which must be adopted if a particular type of use is selected. Thus, land classified as capable of carrying forests without limitation or constraints may be also classified as capable of supporting olives if soil structures which will prevent erosion are installed and if planting and ploughing are arranged on the contour.

The results of this analysis would be threefold. Firstly, the land resources of Syria would be described in a framework of land utilisation types and agro-ecological zones. The types would be classified on the basis of the soil resources, the climate, the rainfall, the elevation and the hazards attendant upon the kind of production system. Secondly, maps would be prepared showing the suitabilities of each land mapping unit for each defined kind of use. A series of maps showing suitable and undesirable forms of land use would be printed. Thirdly, statements on the consequences, favourable and unfavourable, of applying each kind of land use to each area of land would be made.

The combined results would enable the government to make the best informed choice about the use of land throughout the country. It would be possible to define the best farming system or other type of use for land and what the likely consequences of such use would be.

This information will allow government to pursue in detail the imperatives of the National Soils Policy since land use would be allocated on rational grounds.

i. **Developing a capacity for land capability evaluation** - The protocols of conducting land capability evaluation are already established in literature. Syria would need international support in this respect. A brief project outline which will serve as the spur for an evaluation of the whole country is contained in Part 5 of this document.

Briefly, the government will establish a General Directorate for Soil Research within the MAAR. This Directorate will have a capacity to undertake land capability evaluation as well as other responsibilities outlined in Section 4.3.1. The evaluation section will commence its work by capturing all currently available information on the land resources. Subsequently, it will embark on a systematic gathering of all the field data on land qualities and current land use and will complete the land capability evaluation by correlating land resource information with land use. It will derive recommended forms of land use for each land class and will describe the constraints applying to each alternative kind of land use in each land unit.

The approach taken will be multi-stage. It will include the use of satellite information, aerial photography and ground truth. The government will ensure that the Soil Research Directorate has access to the information and facilities available in the General Organization for Remote Sensing.

ii. **Identifying causes of land misuse** - The examination of the current land use data in combination with the land capability evaluation will allow the government to identify those areas being misused and the underlying causes of that misuse. It will thus be permitted to remove or to modify them. Agricultural practices will not be the sole cause of misuse. Other factors such as land tenure, fragmentation, water pricing, subsidies and incentives may also be identified as the causes of land degradation.

Government will not expect the situation to change overnight, but will introduce gradually the changes in agricultural and irrigation practices and in the social and institutional framework in the country.

iii. **Recording changes in the condition of land monitoring** - Environmental rehabilitation and management depend upon the availability of organised and reliable information on the state of the environment, its trends and their relationship to social and economic factors. Decisions taken on land management in the absence of this information may be detrimental to the proper conservation of soil resources.

Reliable information subject to comprehensive analysis must be made available to planners and land managers in a usable forms.

Recognising that it needs to know the effect of land use policies on land and soil condition the government will establish a land condition surveillance network. It will be operated by the General Directorate of Soil Research. The data acquired will give objective information on soil conditions through time. If necessary land use practices will be adjusted so that the objectives of the National Soils Policy remain achievable.

4.1.2 Land tenure, land fragmentation and farm viability

The government will investigate the impact of lot fragmentation on land use practices. In particular it will assess the adverse effects which the overuse of small lots of land could have on the productivity of land resources. As a part of this programme the government will establish a minimum farm size for each class of land use in each agricultural region. It will introduce enabling legislation to prohibit the breakup of land below the minimum size for viability.

The government will review its land tenure policies in the Badiah and marginal lands with the intention of developing within farmers there a corporate and social responsibility for the land. It recognises that common ownership may not always be in the best interests of continued production from the land. Some progress has been made in this direction.

4.1.3 Price strategies and incentives to production and conservation

The government will examine the pricing structure for agriculture products to determine whether the current policies are contributing to land degradation. In particular, feed subsidies on barley grain will be

reviewed in relation to meat prices as current price disparities encourage farmers to retain stock during drought periods.

The government will examine the feasibility of reducing the duty on a range of agricultural imports where their use can improve the productivity of land.

The government will give encouragement to groups who form cooperatives for the purpose of land consolidation. Their objective should be to increase production and to halt land degradation. The encouragement will take the form of credit supports and financial incentives.

The net cost of all works undertaken on farms or in cooperative projects between farmers should be an allowable deduction from income for taxation purposes.

4.1.4 The introduction of appropriate technology

Recognising that land degradation results primarily from poor land management practices the government will strengthen the research capability in farming systems studies in the MAAR. Priority will be given to research and demonstration which is multi-disciplinary and which provides for the integration of inputs from a number of the directorates within the Ministry. The directorates will be expected to prepare a basis for cooperative effort and the government will provide the administrative structures which will facilitate the collaboration foreshadowed here.

The government will investigate the potential of agro-forestry in areas not capable of sustaining arable agriculture. Encouragement will be given to farmers who establish trees on land now used solely for grazing purposes.

The augmentation of the extension service to assist in the dissemination of advice is discussed in Section 4.2.

4.2 The Encouragement of Participation in the National Soils Policy

The government will be proactive in seeking broad based support for the National Soils Policy throughout all sectors of the economy. Farmers, school children and adults throughout the community will be involved. Two main thrusts of the education programme can be identified; adult education and agricultural extension. Other methods of encouraging the adoption of the Policy are also discussed.

4.2.1 A campaign of national awareness for the environment

A national publicity campaign to alert all members of the country to the problems of degradation will be undertaken. The fundamental importance of good land management practices will be stressed to all sectors of the community. The involvement of all in the conservation of land resources will be stressed. The influence which industrial developments, townships and infrastructures such as roads and bridges can have on the condition of land will be emphasised. The techniques which can be used by all sectors

of the community to avoid land degradation and to overcome it where it has occurred will be outlined.

The campaign will fully exploit the press, radio and television. It will begin in schools where the teaching of conservation values and respect for land will become part of the national curriculum.

The campaign will make adults aware of environmental problems and possibilities, of how the changing state of the environment and the soil resources of the nation affect their wellbeing and how their life styles affect the soil resources. Soil will be shown to be an essentially non-renewable resource in economic terms. The involvement of all citizens in the pursuit of the goals of the National Soils Policy will be outlined.

Leading national personalities will be continuously involved in publicising the virtues and necessity of sound land management in the context of the national conservation programme.

The national awareness campaign will be a sustained effort and will remain a part of government policy being provided for each year in the national budget.

Training in environmental managment will be included in the professional training given to engineers, architects, builders and town planners.

4.2.2 Strengthening of the extension service

An efficient extension service is the critical element in the adoption of improved farming practices by farmers. The government will strengthen the capacity of the extension service to provide farmers with information so that they might make rational decisions on land management practices.

The extension service will be provided with all the technical information it requires and to this end a special unit will be created within the MAAR. Its duties will be to form the communication link between the technical directorates of the Ministry and the extension service. It will integrate research findings into operational practices capable of adoption by farmers.

To the extent that it is possible, the extension service will be regionalised so that the information it disseminates is in a local context suiting the particular character of the province and the economic needs of farmers there.

In particular, the technical competence of the extension service will be improved by the provision of technical support services which will supply specialist advice as required to generalist field officers.

The agricultural extension service will take the initiative in the promotion of land conservation practices at the farm level, substituting where required for the Soil Conservation Service. Training programmes in soil conservation will be organised for extension officers on a regional basis so that they may better respond to local conservation issues.

The extension service will encourage the development of local action groups made up of farmers with a common interest in cooperation on land conservation issues. It will form an important link between the farming community, other land users and the techncial and policy advisory groups within the MAAR. The government will establish structures which will facilitate the "bottom to top" flow of information on matters of land care as it recognises that users are the prime decision-makers in the adoption of good land care practices.

4.2.3 Promotion of land user organizations

The General Union of Peasants has an important function in the adoption of better land management practices since it is active at the district and subdistrict level. It provides a statutory forum for the discussion of land management issues by land users. The government will embark on a programme of training the leaders of the local associations in conservation techniques. The training will be carried out by the extension and conservation services once these are adequately strengthened and trained themselves. Local leaders educated in land conservation will be expected to lead their communities in the future through example and counselling. They will be selected therefore from the ranks of practising farmers.

4.2.4 Conservation and short-term benefits

It is unlikely that farmers will adopt land conservation measures if the new practices cause their income to fall, even temporarily. Fully appreciating the impasse which faces farmers the government will require the MAAR to undertake regional studies which identify farming techniques which can increase profits or reduce risks while conserving the soil resources. In some cases these will include technical solutions while others may be a mix of the technical with price and incentives.

As it is not possible to arrive at solutions of universal applicability this research will be directed regionally.

Some solutions may involve cooperative action between farmers in, for instance, local sub-catchment management. The government will provide additional incentives for groups which act together in approved programmes.

4.3 National Institutions

Sections 4.1 and 4.2 of this document have established the strategies which will be developed by the government in the pursuit of the objectives of the National Soils Policy. This section discusses the institutional and structural arrangements which will be necessary for the implementation of the strategies. It outlines the areas of cooperation which will be required and the need there will be for consultation on all land use matters.

A corporate structure ordering the operation of ministries and authorities is already in place in Syria. It has been developed particularly to assist with the planning of agricultural programmes and to institute much needed agrarian reform. The proposals here merely facilitate the adoption of better land use practices. No significant structural rearrangement is proposed.

4.3.1 A General Directorate for Soil Research

The centre-piece of the National Soils Policy is the establishment of a capacity for land use evaluation in Syria. It must be realised that land use evaluation refers not only to the use of agricultural land, but also to the use of land for any purpose consistent with its potential. The National Soils Policy therefore will affect all sectors of the Republic since each institution and each person is a land user.

To achieve the coordination required and to further the cause of proper land use it is intended that a General Directorate for Soil Research will be established in the MAAR as discussed in Section 4.1.1(i).

It will have a number of functions:

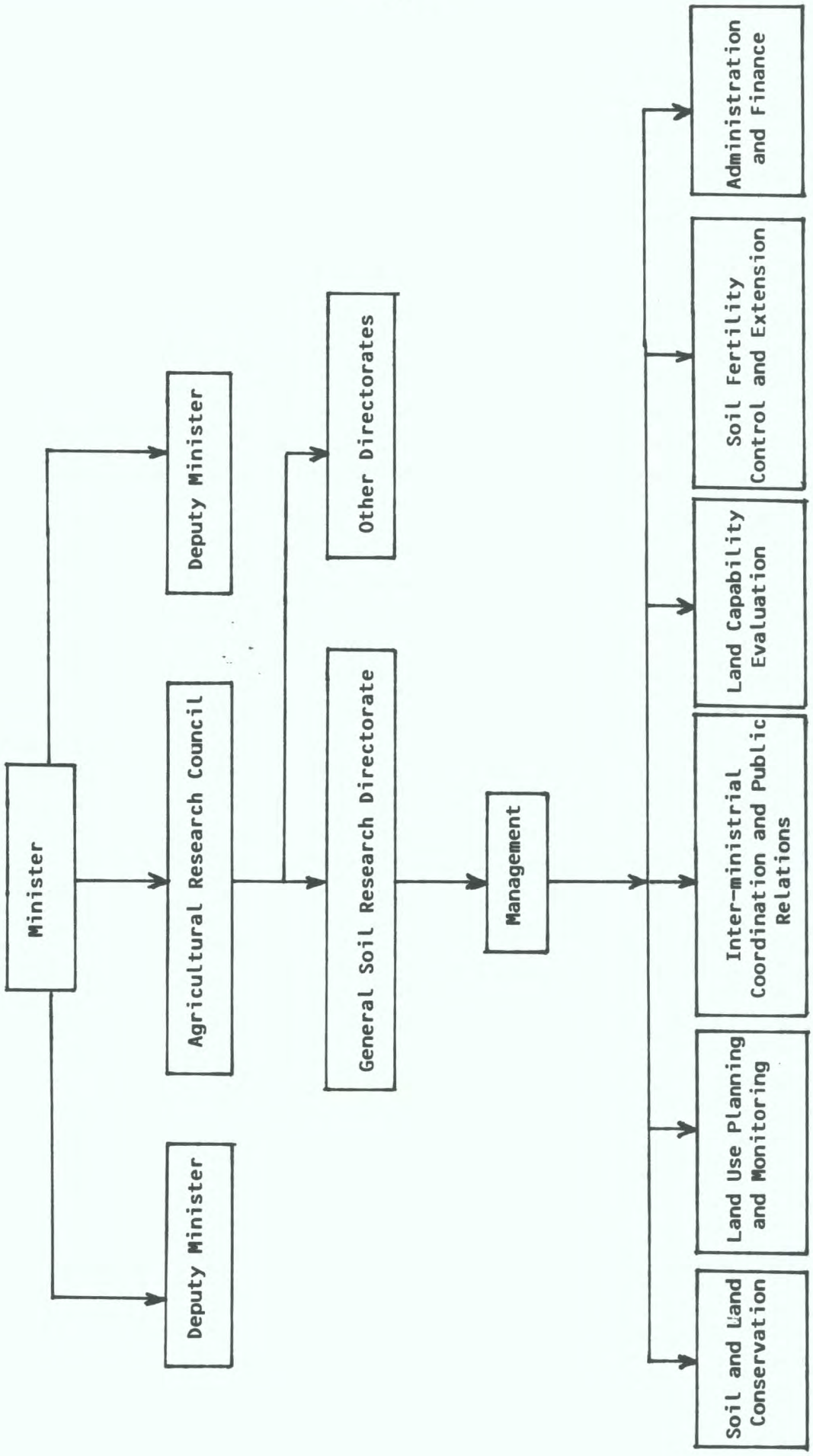
- It will undertake the land capability evaluation required in the Republic and will provide advice to the Agricultural Planning Council on the agricultural potential of each crop in each agro-ecological zone. The Council will then be able to advise the Higher Planning Authority on production targets achievable within a land conservation context.

- It will be the first point of contact when changes in land use in Syria are proposed by any authority, ministry or individual.

- It will be responsible for the monitoring programme on the effects of current land use practices.

- It will advise as required on the formulation and reassessment of conservation strategies and policy development within the various ministries of the government.

The General Directorate will have two wings, one concentrating on agricultural and forestry affairs, and the other on general land use. The foundations upon which both wings build will be the land capability evaluation study which has been described in Section 4.1.1. It will also have a section with responsibilities for inter-ministerial coordination and public relations. The diagram shows the structural arrangement.


Minister
Deputy Minister
Deputy Minister
Agricultural Research Council
Other Directorates
General Soil Research Directorate
Management
Soil and Land Conservation
Land Use Planning and Monitoring
Inter-ministrial Coordination and Public Relations
Land Capability Evaluation
Soil Fertility Control and Extension
Administration and Finance

i. **The agricultural wing** - Equipped with information on the land use potential of each land unit in Syria the agricultural wing will be in a position to advise the Agricultural Planning Council chaired by the Prime Minister and the MAAR on the forms of land use which are possible and of the constraints to use which will apply.

It will therefore assist in the development of achievable short-term and medium-term agricultural plans and targets since these will be elaborated with the knowledge of true land potential. It will be able to suggest modifications to agricultural licensing procedures as it has the information on land potential. It will be able to recommend those areas most in need of subsidies and incentives since it is able to identify the capability of land for the production of individual crops. It will have the information required to locate areas of current erosion and to identify those where proposed land use practices would run counter to the provisions of the National Soils Policy.

It must be stressed that the General Directorate is not a decision making body. That function must be reserved to the planning councils and other sections of government. The General Directorate has the function of integrating all the best information on land use and placing it before the relevant councils for their subsequent action.

ii. **The general land use wing** - As already made clear land use decisions are made by all sectors of the Republic. In the interests of maximising productivity and of retaining open all the options for the future use of land it will be mandatory for all sectors to consult with the General Directorate when a change in land use is proposed. Thus urban and industrial developments and the construction of roads, railways and other works must take land and soil protection into account. The General Directorate will provide advice on alternative land uses and on the potential hazards of the intended use.

The General Directorate will not be a final arbiter on land use decision, but must be consulted since it will be an admitted authority on land potential.

iii. **Land use monitoring** - The General Directorate will be responsible for monitoring changes in the condition of land.

It will submit an annual report regarding the changing condition of land in Syria. It will identify those areas where changes have been adverse and those where practices have been to the advantage of soil and land conservation.

The General Directorate will be responsible for setting the objective standards which will be used in the monitoring programme.

4.3.2 Agricultural Research Council

An Agricultural Research Council will be established within the MAAR. It will be responsible for the coordination of research effort over the wide spectrum of National Soils Policy issues. It will identify the institutions able to undertake the research and will seek out the basis for cooperation between institutions.

The Council will be specially concerned to establish a dialogue with the Consultative Group for International Agricultural Research in order that it may foster bilateral and multilateral research programmes.

The Agricultural Research Council will receive advice from the Higher Planning Council and the Agricultural Planning Council on agricultural research needs in the Republic. It will nominate organisations to undertake the research and will establish the basis for cooperation between institutions.

Annually, it will furnish a report on agricultural research to the Agricultural Planning Council and will enumerate the programmes which require support in financial and other terms.

The Agricultural Research Council will establish the training needs in agricultural science at the under-graduate and post-graduate level with a view to enhancing the capacity for professional training within the universities of the Republic. It will identify the staffing and budgeting needs which will make possible the indigenous training programme.

The Council will also select those areas in which training can be more reasonably gained outside the Republic and will set up a range of selection criteria so that suitable candidates for international training can be chosen.

4.3.3 Soil and land conservation

The government will introduce comprehensive soil and land conservation legislation which crosses sectoral boundaries and which is not limited to agricultural and grazing practices. Soil and land conservation will not be limited in their application to soil alone, but will include the conservation of native plants used for grazing, the mitigation of damage by flooding and the control of salinity and water-logging. Soil and land conservation legislation will also apply to non-agricultural land where its use creates soil and land degradation.

The MAAR will administer the legislation across all the sectoral boundaries. The legislation will include standards of performance which must be met. An outline is in Section 4.4.2.

4.3.4 Statutory planning

The government will introduce planning legislation to rationalise land use in Syria. It will particularly be concerned to develop long-term

planning as a strategy. The fundamentals of the legislation are found in Section 4.4.7.

4.4 Action for Government

The Government of the SAR has developed an impressive infrastructure to assist agricultural and land development . Enormous effort has been expended in the construction of roads and railways and irrigation schemes and in the provision of education facilities and in the delivery of services. The progress which has been made is phenomenal by any standards.

In this section some immediate tactics are suggested. Their adoption would build on the developments already made.

4.4.1 The General Directorate of Soil Research

A General Directorate of Soil Research should be created in the MAAR where it will be in a position to offer advice at an appropriate level.

The General Directorate will have the following functions:

- review all proposals to change existing land use;
- describe the development controls which may be necessary for projects;
- make environmental assessments of proposals aiming at a change in land use;
- provide the Supreme Agricultural Council with advice on achievable targets for each crop type throughout the country;
- undertake the land capability evaluation programme for the whole of Syria; and
- carry out the land condition monitoring programme and will report annually to the Higher Planning Authority on the condition of land in Syria.

Staff will include agricultural planners, socio-ecologists and economists and biological specialists who will interpret the land and soil evaluation information, the constraints to land use of any type and the hazards which will arise from proposed uses. It will therefore have functions before plans are implemented, and subsequently in the monitoring and extension modes.

4.4.2 A land and soil conservation law

Government should introduce a law on land and soil conservation to be administered under the responsibility of the Minister for Agriculture and Agrarian Reform.

The important parts of the legislation will be:

A. **Interpretation:** Definitions will be required for soil and land resources, including vegetation, erosion hazards, the director, provincial soil conservation groups and district soil conservation groups.

B. **Scope of the law:** The law will:

- establish a soil conservation directorate under the General Directorate of Soil Research;
- define the objectives for soil and land conservation;
- make separate provisions for agricultural, forestry and grazing land;
- encourage land and soil conservation by listing incentives;
- discourage poor soil and land practices by prescribing a range of penalties for those who persist in such practices;
- describe the terms of assistance to be given to encourage the adoption of better land management practices. These will include credit and subsidies, the loan of equipment and tenure security;
- create a National Soil Conservation Advisory Committee consisting of representatives of the appropriate government departments, farmers and other interests;
- promote the formation of regional schemes for soil and land conservation;
- advise on taxes and levies in support of conservation works;
- appoint a director for Soil and Land Conservation who will administer the law and represent conservation interests at the relevant councils;
- set-up an appeal system against the rulings of the director.

C. **Responsibilities of the director:** The director will:

- be responsible, through the proper channels, to the Minister for Agriculture and Agrarian Reform;
- prepare and administer staff and financial budgets;
- direct research into conservation practices;
- provide education in conservation for farmers and others;
- approve regional schemes of land rehabilitation;
- approve compulsory action recommended by Provincial Soil Conservation Groups;

- advise the Minister of the cost of implementing regional plans;
- prepare an annual report for the Minister;
- recommend grazing fees and controls in consultation with the Badiah Directorate;
- define grazing districts in association with the Badiah Directorate;
- limit herd and flock sizes in association with the Badiah Directorate;
- be a member of the National Soil Conservation Advisory Committee;
- be a member of Provincial Soil Conservation Groups;

D. **Provincial Soil and Land Conservation Groups** - Provincial Soil and Land Conservation Groups will be chaired by the governor and will comprise the director or his deputy, the Regional Director of Agriculture and four others including members of the Peasants Union and farmers.

The Provincial Group will :

- define priorities - make plans and define objectives in soil and land conservation;
- report on progress with provincial plans and the degree of compliance with them;
- prepare budgets for provincial plans;
- declare areas of soil conservation hazard and recommend strategies and programmes to overcome them;
- declare land management practices which are conservation hazards;
- frame provincial rules in consultation with farmers;
- form soil conservation districts.

E. **Soil conservation districts** - Soil conservation districts will comprise sub-catchments or shall be groups of farmers and others with common land interests.

The Soil Conservation District Committee will consist of the commissioner or his representative, representatives of ministries in the area as appropriate, farmers and others as required.

The Soil Conservation District Committee will:

- advise the Provincial Soil Conservation Group on:

  local hazards;
  support required for the implementation of local soil and land conservation plans.

- lay the basis for local schemes of cooperation;
- undertake local schemes of land conservation;
- recommend the taxes and levies, if any, which should be applied to support local schemes.

4.4.3 The extension service

The acceptance of the National Soils Policy and its objectives by farmers will depend very largely upon the extension service since it is one of the arms of government in close contact with farmers. The inability of the extension service to stimulate interest in conservation has been referred to here and in other documents. The following recommendations are made in order that the deficiencies may be rectified in time.

A. **Inservice training** - Extension officers should receive training in land and soil conservation principles which operate at the field level. This training should emphasise the micro-catchment approach, the use of structures and place of better land management systems in overcoming land degradation problems. Other in-service courses should be arranged as required. All courses for extension officers should be the responsibility of the Training Directorate in the MAAR.

B. **Dissemination of information** - An information unit should be established in the MAAR to integrate the results of inter-directorate research into regional land management packages. These packages would be tailored to farmers' needs on a regional basis.

C. **Regionalisation of extension services** - The corporate structure of the extension service would be reorganised so that it can become more responsible to the provincial directorates. This would permit flexibility in the allocation of budgets and manpower to local needs. A management tree should be created to promote efficiency on a regional basis. It would describe the regional extension objectives for each officer and group of officers.

Local and regional extension services are much more effective than those organized nationally. They respond rapidly to local needs and are accepted more rapidly by farmers since they create the opportunity for interaction between themselves and the government body.

D. **Undergraduate training** - The university agricultural engineer courses for general extension officers should be strengthened in extension methods and communication skills.

E. **Career structure** - An examination of the pay and promotional scales and career opportunities for extension officers should be made with a view to developing a corps of experienced and well motivated extension officers in the field.

F. **Technical support services** - Technical support groups servicing regional extension officers in specific technical matters should be formed. See Section 5.4. The building up in this way of self-esteem in the extension service and in their relevance in the eyes of farmers can only enhance the performance of the service.

4.4.4 The Badiah problem

A description of the approach to the resolution of the Badiah problem is given in Section 5.2.

The importance of the Badiah to meet production in Syria has been raised elsewhere. The Ministry has a Directorate of the Badiah located in Tadmor. It has embarked on a number of programmes directed at some of the resource based aspects of Badiah management. The social and economic component of the Badiah ecosystem are not tackled. They are, however, a part of this very complex production system and must be considered if the obvious problems of incorrect resource management are to be solved.

The Badiah is a complex of:

- natural resources of plants, animals and soil as yet poorly understood;
- sheep and goat flocks and herds;
- erosion and degradation problems;
- bad range condition;
- traditional uses and patterns of management;
- a difficult area to provide with social services;
- a common grazing tenure system with few cooperatives;
- over-population;
- inappropriate price support mechanisms;
- difficulty in obtaining good officers to work there;
- catch cropping;
- intensive agricultural developments which promote increasing stock numbers;
- prices paid for product;
- underground water resources.

Each of these components influences the other and changes in one can cause perturbations in another. Thus schemes to reseed the Badiah can be

ineffective under common grazing tenure, or the development of more intensive agriculture can lead to more stock locally and the increase of grazing pressure on land which is already overused. Restrictions on grazing numbers will upset traditional users of the Badiah and adversely affect their incomes.

Clearly there is no one simple solution. The Badiah problem demands an integrated approach which concentrates on those elements which will be most amenable to change and where for a given amount of effort the response will be greatest.

Today, functioning models of such systems can be built. They take into account the workings of the whole system by developing sub-models which relate to each other. Sub-models of sheep flocks, for instance, would be related to feed available, to social and economic demands etc.

This computer modelling, called "expert system" analysis, provides an excellent opportunity for the MAAR to develop its priorities for the Badiah and is therefore recommended. It will determine what mix of intervention, sedentarisation, training, supports and agricultural inputs will best solve the Badiah problem. The clarification of the issues will include a sensitive treatment of the pattern of life and expectation of the people.

4.4.5 Agricultural Research Council

The need for an Agricultural Research Council was raised in Section 4.3.2. Preliminary steps to form such a group have been made. It is important however, that the group should become active and productive as soon as possible. The following arrangement of membership, disciplines, and responsibilities is recommended.

A. Membership:

- Minister for Agriculture and Agrarian Reform; Chairman.
- Representative of the General Union of Peasants.
- Representative of each ministry dealing with agriculture e.g. the Euphrates Authority.
- Deans of the Faculties of Agriculture.
- Directors of Soils and Research Directorates MAAR.
- Representatives of Consultative Group on International Agricultural Research.

B. Disciplines:

- Land management - soil related matters.
- Water management - irrigation.

- Forest management.
- Rangeland management.
- Animal husbandry and breeding.
- Environmental management - impact of practices.
- Agricultural practices - fertilizers, rotations, varieties etc.
- Socio-economic conditions.

C. **Responsibilities:**

- Creation of priorities for research and funding.
- Integration of institutions, research facilities and personnel in projects.
- Integration of socio-economic evaluation into research projects.
- Identification of training needs at the undergraduate and post-graduate level.
- Annual report on research in progress.
- Act as a catalyst in promoting cooperative research.
- Identification of staffing and financial requirements in agricultural research.
- It is important that the Council be functional and that its members are fully committed.

4.4.6 Agricultural education

It is recommended that the MAAR should commission a working party to investigate education in agriculture in Syria. The working party should consist of representatives from:

- The MAAR.
- Agricultural Industry.
- Ministry of Education.
- Universities.
- Technical colleges.

The terms of reference should include:

- Vocational training for technicians in agriculture.

- Coordination between universities in matters of curriculum and teaching standards.

- Financial requirements for teaching in agriculture in terms of salaries, capital works, scholarships, operational costs etc.

- Funding and development of a postgraduate research capability in Syria.

- Special emphasis on the teaching of agricultural extension and socio-economic issues in agriculture.

4.4.7 Statutory planning legislation

Statutory planning legislation is the vehicle by which land use planning and proposed developments are combined in a harmonious mix in which economic efficiency, community satisfaction and the effects on environmental quality are considered. Statutory urban and regional development plans are prepared to encourage the proper management, development and conservation of natural and man-made resources for the purpose of providing for the social and economic welfare of the community and a better environment. The plans would embrace the whole country eventually. They would designate the principal activities which may be carried out in each portion of the planning area. The land best suited to agriculture, industrial and urban development is thereby allocated.

Once prepared by a planning authority and approved by government future use of the land must conform to the specifications in the statutory plan. Normally, the plan is reviewed from time to time. Reassessment however, is rarely conducted at intervals of less than five years.

The legislation use to provide for statutory planning may take many forms. A common system would be to have a state planning law administered by a commission responsible for environmental planning and assessment.

The law would encompass the following:

- Creation of the Environmental Planning and Assessment Commission.

- Designation of responsibilities to create urban and regional plans.

- Provisions to ensure strict adherence to plans and their implementation, including the prescription of penalties.

- Provisions regarding land fragmentation.

- Requirements for environmental assessments of development.

In Syria it may be possible for the legislation to be administered by the Minister of Agriculture and Agrarian Reform in the General Directorate for Soil Research.

5. RECOMMENDATIONS FOR FOLLOW-UP ACTION

The previous sections have dealt in general terms with the development and application of a National Soil Policy in Syria. This section, describes in limited draft form only, a number of programmes and projects which are needed to implement the policy and to initiate national action.

5.1 Developing a Capacity for Land Evaluation

A capacity for land capability evaluation has already been identified as a fundamental need in Syria. It will guide decisions on land use in such a way that the soil and land resources are put to the most beneficial use for man while retaining their ability to produce in the future. The planning requires an understanding of the climate, land forms, soils and vegetation which comprise the environment and of the kinds of land use proposed. In the context of Syria they require an understanding of the national goals in agriculture.

Land evaluation demands an understanding of the constraints of land use and of the potential hazards attendant on each form of land use. It is imperative that the Syrian Arab Republic has the opportunity to develop this capacity. It is suggested that an internationally funded project be developed with the following objectives.

1. To conduct land evaluation for sound use planning in the Hassakah province. Hassakah province is arguably the most productive province agriculturally in the country. The protocols developed and the techniques and methodology adopted will form a pattern for land use evaluation in the remainder of the country.

   The project would consist of international experts, and local counterparts. It would include a training component.

2. To utilize the Remote Sensing facilities in Syria in association with other government agencies concerned with the acquisition, analysis and display of information. The facility would service the future needs of the country in land use evaluation and planning.

   It would set the protocols for data collection, land capability evaluation, the assessments of constraints, the decision-making process and monitoring of change. It would lay the basis for effective land use planning and land allocation across all sectors of the economy.

5.2 An Expert System for the Badiah

The Badiah is the principal resource used by grazing sheep in Syria. Degradation is widely reported and there is abundant evidence that it is a continuing process. The deterioration of this resource is a result of a combination of forces including traditional uses, overgrazing, over-population, rapid transport and water developments and ploughing. A number of proposals have been made by others in respect of the problems of

the Badiah. There is a considerable body of information available on the way in which the elements of the environment function. There is, however, no information on the inter-relationships which exist between the partial processes which comprise the Badiah ecosystem. Consequently no unifying proposals for the treatment of degradation have been developed.

"Expert systems" offer the opportunity to integrate information already required, here and elsewhere, on ecosystem functioning. They can include a consideration of the social, environmental and economic variables which drive decision-making. The creation of a system enables the components of the system to be ranked in importance and for the most important elements affecting regeneration to be identified.

It is recommended that an internationally funded project should prepare an "expert system" which treats the Badiah as a single production unit. It is recommended that the team should include a sociologist an economist and a range ecologist.

5.3 Wind Erosion

Wind erosion is a serious problem in the east of Syria where the ploughing and overgrazing of erosion prone soils have produced widespread sand drifts and hummocking. Sand movement has been severe enough to engulf some houses and to move onto irrigated land bordering the Euphrates. The problem appears to be of comparatively recent origin (twenty years or less) since the windblown sand has not coalesced into coherent dunes.

The devastated area is now a wasteland produced by inappropriate land management practices. It is a two dimensional issue because it affects grazing and marginal cereal land and threatens as well the irrigated lands down-wind.

It is not possible to define the details of the problem since the source could not be accurately identified. It is possible to say, however, that some 2 000 square kilometers at least are affected. In the interests of land stability and future productivity the problem should be addressed.

It is recommended that an internationally funded project be established to investigate the source of the problem and to develop wind erosion control techniques and grazing management practices which will alleviate the situation.

Once the causes have been identified and the remedial treatments defined the project may be expanded to include the rectification of the problem through field works. It would be inappropriate for the project to begin with treatment works without any investigation of the contributing factors.

5.4 Extension Service

The central role of the extension service in the adoption by farmers of better land management practices has already been emphasized in this document. The inability of the extension service to carry out its obligations under the National Soils Policy have also been discussed. The

reasons for the deficiencies have also been highlighted. They include problems with transport, motivation and a lack of professional and disciplinary confidence. Most extension officers being generalists do not have the ability to satisfy the demands made on them for specialist advice. They thus lack a feeling of self-esteem. It is difficult for them, therefore, to appear relevant to the farmer. It is important that confidence is built up.

The competence of the extension service could be enhanced by the introduction of cells of specialist support established on a regional basis throughout the country. The specialist cells would provide the advisory services with information on a range of skills including animal husbandry, horticulture, cereal production and the like depending upon the needs of the particular agricultural district being served.

It would be too simplistic to suggest that the creation of the disciplinary cells would solve an inherent problem. It is recommended therefore that an international project be funded with the objective of strengthening the extension service. The brief would contain such elements as training, career range, organisation, management structure suited to the Syrian stituation, extension content and the dissemination of information.

5.5 Water Harvesting, Flood Control and Wadi-based Agriculture

Wadi farming is an important contributor to agricultural production in Syria particularly in those areas in the north west of the country. Production there is hazardous and unreliable since wild floods frequently destroy crops, fields and houses and cause water erosion. In order to bring some stability into the system and to prevent further land damage an investigation of the wadi farming ecosystem should be undertaken.

An international team should take a holistic view quantifying such aspects as catchment size, rainfall reliability, run-off peaks and water yield. The significance of water flow control structures across wadi bottoms and the value of water spreading structures in reducing water damage should also be investigated. The team would include the social and demographic aspects of wadi farming in its studies.

Should an analysis reveal that water management is feasible given the local constraints the project may be expanded to include the installation of some flood and water control devices.

5.6 Monitoring Land Condition

The objective measurement of change in land condition is an absolute necessity in the management of land. Government must know what the results of its land management strategies have been and indeed what is the general trend in condition of that fundamental asset of the nation, the land and soil. Quantitative and therefore useful information on the changes which have taken place through time can only be obtained from a competent and comprehensive monitoring network developed at a scale where the consequences of land management practices can be accurately recorded.

The methodology for land condition monitoring have been substantially improved in the past decade or more. They now go beyond the simplistic recording of annual or seasonal changes in plant growth and allow the user to discriminate the causes of land deterioration. Many systems now being put into operation incorporate satellite, small scale and very large scale (1:200) aerial photographs and ground recordings.

It is recommended that a land condition monitoring capability be developed for the unique problems in Syria. An internationally funded programme directed at defining the techniques, recording the data, analysing and reporting the findings should be elaborated.

It should concentrate on the two important areas of Syria, the native grazing land and the cereal production areas. Both are of central importance to the food production objectives. In each, production must be sustained and even improved. Equally therefore further land deterioration should not be permitted.

The methodologies and the intensity of the surveillance network are likely to be quite different for each area although the data would be stored and analyzed in a common facility. The funded programme would:

- develop methodologies suited to the two environments;
- decide upon the intensity of recording required;
- establish the central analysis facility;
- define the training and staffing requirements;
- install the monitoring networks, or parts thereof in each area;
- arrange to complete an analysis of two data sets separated sufficiently in time to be meaningful for each of the areas.

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