

**European Co-operation
in the Field of Scientific and
Technical Research**

COST
Secretariat

COST 341/8 - CY

4 May 2000
A. Caramondani



Management Committee COST 341

Habitat Fragmentation due to Transport Infrastructure

Subject: National State of the Art Report - Cyprus

COST 341/8 - CY

COST ACTION 341
HABITAT FRAGMENTATION DUE TO TRANSPORT INFRASTRUCTURE

Brief Paper on the Current Situation (State of the Art) in Cyprus.

1.0 INTRODUCTION

During the last Cost 341 meeting on April 3, 2000 in Sitges, in Spain, it was decided that due to the late actual participation of Cyprus in the Management Committee of Cost Action 341, it is impossible to prepare a State of the Art Report in the format and with the context specified by the Action. In the above meeting, the representative of Cyprus stated that an attempt would be made to produce a short paper with a general overview of the current situation on Habitat Fragmentation due to Transport Infrastructure in the rural areas of Cyprus for the purposes of COST Action 341. This short paper summarises the key issues on the matter for consideration by the group responsible for the preparation of the European State of the Art Report.

2.0 GENERAL INFORMATION ABOUT CYPRUS

- 2.1 Cyprus is the third island in the Mediterranean, after Sicily and Sardinia, but the largest Island State, with an area of 3,572 sq. miles (9,251 sq. kms). It is located at the northeastern corner of the Mediterranean and commands a "cross-roads" position, linking the east with the west, Europe with Africa and the Middle East. The population of Cyprus in 1994 was estimated at 729,800 persons. Since 1974, approximately 37% of the country's territory are occupied by Turkish troops following the invasion of the island by Turkey. This paper mainly refers only to the area under Government control.
- 2.2 Turkey's military invasion had devastating effects on the island's physical structure and socio-economic sectors. It disrupted the settlement and communications systems that developed in Cyprus through the centuries and has enforced duplication of the major infrastructure such as airports, ports, power plants, roads etc. with adverse effects on the environment.
- 2.3 Despite the 1974 tragic events, the economy of Cyprus flourished and today it is considered as one of the strongest economies in Europe. Transport, which is vital to both the economic and social well being of a country, experienced a parallel and related growth over the last 20 years. Transport in Cyprus constitutes an infrastructural sector covering a wide spectrum of different

activities such as road, air and sea transport and services allied to transport mainly provided by travel agencies and shipping offices. The contribution of the transport sector GDP in Cyprus fluctuates at around 8% and it plays a significant role in the development effort, particularly in tourism and the export of goods and other services.

- 2.4 Land transport constitutes the only means of inland travel in Cyprus. The total number of vehicles in 1995 in Cyprus was 438,848. Private saloon cars constituted the biggest category or 53.5% of all vehicles. In relation to the population, there correspond 2.7 persons per car. Table 1 contains similar indices in various countries for comparison purposes.
- 2.5 On the basis of recent statistics, the road network in the free areas of Cyprus consists of about 6000 km of the paved roads and 4000 km of unpaved roads. The Department of Public Works is responsible for about 40% of the paved roads, which constitute the main road network of the island. The remaining roads come under the jurisdiction of the Municipalities and the District Administration.
- 2.6 The rural road infrastructure in Cyprus has developed considerably in recent years. The first major scheme after the 1974 Turkish invasion was the Nicosia-Limassol motorway completed in 1985. Road development has continued ever since under the "Third" and "Fourth Highway Projects" and the "Transport Sector Development Project" which were mainly financed by the World Bank and the Kuwait Fund for Arab Economic Development. Figure 1 and Table 2 indicate the road projects and transport studies completed over the last 20 years. Maintenance programmes for the road network have also been set up and are being implemented in phases.

TABLE 1***PERSONS PER CAR IN USE IN VARIOUS COUNTRIES, 1986 - 1994***

1985	1987	1988	1989	1990	1991	1992	1993	1994	Country
									<i>EUROPE</i>
2,9	2,8	2,7	2,6	2,5	2,5	2,4	2,5	2,3	Austria
2,9	2,8	2,5	2,7	2,6	2,5	2,5	...	2,5	Belgium
8,3	7,9	7,6	7,3	7,0	6,8	6,2	5,8	5,3	Bulgaria
...	...	...	5,9	5,9	6,5	7,1	7,4	6,8	Croatia
4,2	3,9	3,7	3,4	3,2	3,1	3,1	3,1	3,0	Cyprus
3,2	3,1	3,1	3,1	3,1	3,1	3,2	3,1	3,1	Denmark
3,0	2,9	2,8	2,6	2,6	2,6	2,6	2,7	2,7	Finland
2,6	2,5	2,5	2,4	2,4	2,4	2,4	2,4	2,3	France
2,2	2,2	2,1	2,0	2,1	2,6	2,5	2,1	...	Germany
7,5	7,0	6,7	6,3	5,8	5,8	5,6	5,3	5,0	Greece
6,9	6,4	5,9	5,7	5,3	5,1	5,0	4,9	4,7	Hungary
2,5	2,4	2,3	2,2	2,1	2,0	2,0	...	...	Italy
2,4	2,3	2,2	2,1	2,1	2,0	1,9	1,8	1,8	Luxembourg
3,0	2,9	2,8	2,8	2,7	2,7	2,7	2,7	2,6	Netherlands
2,6	2,6	2,6	2,6	2,6	2,6	2,7	2,6	2,6	Norway
9,5	8,9	8,4	7,8	7,3	6,3	5,9	5,7	2,4	Poland
3,9	3,8	3,6	3,4	3,3	3,1	3,0	3,0	2,9	Spain
2,6	2,5	2,4	2,4	2,4	2,4	2,4	2,4	...	Sweden
2,4	2,4	2,4	2,3	2,2	2,2	2,2	2,2	2,2	Switzerland
...	41,8	38,5	34,4	40,0	27,3	23,2	18,6	20,2	Turkey
3,2	3,2	3,0	2,9	2,8	2,8	2,8	2,8	...	United Kingdom

TABLE 2

**EXISTING ROAD AND LAND TRANSPORT DEVELOPMENT IN CYPRUS
COMPLETED PROJECTS**

First Scheme after 1974	Third Highway Project	Fourth Highway Project	Transport -Sector Development Project
Nicosia - Limassol motorway	<ol style="list-style-type: none"> 1. Limassol by pass -urban motorway of 19 km. 2. Four modern vehicle inspections centre in all major towns. 3. Three studies as follows: <ol style="list-style-type: none"> a. Improved road maintenance b. Limassol -Paphos Road feasibility study c. Tillyria access road study 4. The improvement of 176 km of secondary rural roads 5. Rehabilitation /strengthening of Nicosia -Limassol motorway 	<ol style="list-style-type: none"> 1. Larnaca -Nicosia motorway of 23km. 2. Improvement of 43 km of secondary rural roads. 3. Rehabilitation of 52 km of rural roads. 4. Four Studies as follows: <ol style="list-style-type: none"> a. Road safety b. Regional traffic control (SCOOT) c. Transport Sector Master Plan d. Pavement and Bridge design. 	<ol style="list-style-type: none"> 1. Aradippou - Dhekelia link - motorway of 13km 2. Nicosia - Kokkinotrimithia road -motorway of 13 km 3. Improvement of 19 km of existing secondary rural roads.

NOTES:

- a. Another major project under construction as separate contract is the Limassol - Paphos motorway -75 km
- b. Plans are being prepared for the future construction of the Larnaca - Famagusta motorway. Part of this has already been constructed.

3.0 KEY ECOLOGICAL CHARACTERISTICS

- 3.1 Cyprus is located at the crossroads of the three major flora zones of Europe, Asia and Africa, and it is therefore not surprising that the number of plant species found on the island runs to 1.570, of which 127 are endemic. In the Akamas Peninsula the number of species is approximately 530, of which 33 are endemic. Thus, the ecological and scientific value of the area is self-evident. Calabrian Pine forests; Phoenician Juniper maquis, RockRose maquis, and mosaics of Calabrian Pine stands with maquis are the major plant communities of the area. The maquis are characteristics of the Mediterranean climate. The variety of fauna is equally as impressive: 168 birds, 12 mammals, 20 reptiles and 15 butterfly species have been sighted in the area.
- 3.2 The geology is one of the most diverse in Cyprus. Almost all the geological formations found on the island are present in the area. These are (1) the Troodos Ophiolite, (2) the Troodos sedimentary succession, (3) the Mamonia complex, and (4) the serpentine. The wide range of geological formations along with the topography of the area results in different microclimates, the impact of which is reflected through the variety of plant communities and the large number of plant species and particularly species.
- 3.3 Cyprus has recently declared, through Planning and Environmental Legislation large and unique parts of the Island as Nature Reserves. The most important ones are the Akamas areas in the western part of the island Cape Greco in the east and parts of the main mountain range of Troodos. These areas are areas of exquisite natural beauty and contain a lot of unique species of the fauna and flora of Cyprus. Their protection is vital for the maintenance of the natural biodiversity of the island (Attached please find special leaflets on the areas of Akamas and Troodos).
- 3.4 Special attention is given to the moufflon, which is the biggest animal of the Cyprus fauna and it is a protected species. Its former scientific name was *Ovis orientalis*. However, in recent years following long and in depth studies by a Cypriot biologist a new scientific name was given to it, *Ovis gmelini ophion*. The Cyprus moufflon is a kind of wild sheep and is found only in Cyprus. Other kinds of moufflon are to be found in various Mediterranean countries such as Turkey, Syria, the islands of Sardinia etc.
- 3.5 The moufflons are very shy and agile, they move very fast on the steep slopes of the Paphos forest and are very difficult to approach by human beings, especially when they are frightened. The mature male moufflon is a strong, well-built and beautiful animal. It has a thick and plentiful hide, which in

winter is of a light brown colour, with light grey on the back and an elongated black patch round the neck. In summer its hide becomes short and smooth, with a uniform brown colour and white on the under part of its body.

- 3.6 The male moufflons have heavy horns in the shape of sickle. The length of the horns of the mature animals is between 55 and 60 centimeters. The weight of the male is around 35 kilos while the female weighs around 25 kilos. Its height is around one metre. Its habits are almost always the same.
- 3.7 During the summer, the moufflons live on the high mountains of the Paphos forest, like the Tripilos region. The Tripilos Mountains stand at 1.362 metres and overlook the Cedar valley. In the winter, when the high peaks of the mountains are covered with snow, the moufflons come down to lower pastures in search of food. At times, when there is not enough food in the forest, the moufflons venture to move to the edge of the forest to search food.
- 3.8 In autumn, during the mating period, the moufflons form herds in groups of 10-20 male and female animals. In spring, however, when the delivery time is approaching, the herds are divided into small groups of two to three animals, or even one in the case of male moufflons, which roam about alone.
- 3.9 The female moufflons give birth to either one or two young ones in April or May. The newborns are very lively from the moment they are born so that they can face the many dangers that threaten them.
- 3.10 The Department of Forest of the Ministry of Agriculture, Natural Resources and the environment has many records on the fauna and flora of Cyprus (some of the data has been compiled using the GIS System). At the moment Cyprus participates in the European programme NATURA 2000 and data on the unique fauna and flora of the island will be collected, compiled and organised with location mapping etc, so that it will eventually form part of the European Union data base for fauna and flora. (Please, find attached a leaflet on the flora of the forests of Cyprus).

4.0 THE INSTITUTIONAL FRAMEWORK FOR ENVIRONMENTAL PLANNING AND MANAGEMENT.

- 4.1 Road infrastructure has been the main cause for Habitat Fragmentation in Cyprus. Steps for environmental protection and management have been taken on an organised basis in recent years as described below, and hopefully this will minimise and manage the problem of Habitat Fragmentation.
- 4.2 Cyprus has endorsed the principles of sustainable development and has undertaken a process to integrate environmental consideration into those of its economic and social development policy, and to ameliorate those aspects of development policy that may run contrary to the principles of sustainable development. In view of the stage Cyprus socio-economic development has reached, development objectives are pursued in conjunction with the preservation of the natural environment and the development effort is gradually readjusted, so as to be in line with the concept of sustainable development.
- 4.3 In the last few years, the Government of Cyprus has put together a number of measures as part of an overall environmental policy. The overall responsibility for environmental issues, excluding physical planning issues, rests with the Minister of Agriculture, Natural Resources and Environment, who is being assisted by an inter-ministerial Environment Council, which includes the business world, NGOs etc. The Environment Service co-ordinate programmes for the protection of the environment, advises on environmental policy formulation and ensures its implementation and handles the environmental impact assessment process.
- 4.4 The environmental management framework is interlinked and co-ordinated with physical planning framework, responsibility for which is under the Ministry of Interior.
- 4.5 An Integrated System for Environmental Impact Assessment was approved by the Council of Ministers in 1991, based on the relevant European Union directive and UNEP's methodology. There is no specific legislation for EIAs but relevant provisions have been included in the draft of the Environmental Framework Law. Projects for which the procedure is applicable include tourist installations, aquaculture projects, ports, marinas, fishing shelters and breakwaters, wastewater treatment plants, solid and liquid disposal areas, dams, major roads, quarries, industrial areas, airports, etc. According to this system, public projects with cost over £ 1, 000, 000 (1, 615, 000 Euros) and private projects with a cost over £ 500, 000 (810, 000 Euros) have to carry out an Environmental Impact Assessment (EIA) before implementation.

Environmental and Planning Authorities are legally entitled to demand EIAs for any project they consider environmentally sensitive, irrespective of cost.

- 4.6 It is also worth mentioning that an Environmental Review and Action Plan for Cyprus was prepared by the World Bank in 1993, whereas in 1995, a comprehensive report was prepared by an interministerial committee on the issue of streamlining the country's environmental policy and legislation with those of the European Union. As a result of the above, as well as of the outcomes of the Barbados and Tunis Conferences on the Sustainable Development of Small Island States and of Mediterranean Countries, respectively, an Action Plan for the Protection of the Environment was approved by the Council of Ministers in March 1996. The Plan deals with horizontal integration issues such as Fiscal Instruments, Information, Research and Participation and with subject-matter issues in the fields of General Environmental Policy, Water protection and Management, Radiation, Atmosphere, Noise, Chemicals, Industrial Accidents and Biotechnology and Protection of Nature and Wildlife.

5.0 BRIEF DESCRIPTION OF SOME MEASURES TAKEN ON HABITAT FRAGMENTATION.

- 5.1 The design of all the motorways (class A Roads) of Cyprus has catered for Habitat Fragmentation through the following measures.
- 5.1.1 The preparation of detailed Environmental Impact Studies, which among other things evaluate the effects on flora and biodiversity and propose mitigation measures. In some cases complete rerouting of a motorway may be suggested and implemented as a result of the Environmental Impact Study.
 - 5.1.2 The awareness of pressure groups and environmental organisations concerned with the environment and nature conservation also affect the planning and implementation of motorways. Such pressure groups have also raised Government awareness on matters such as Habitat Fragmentation.
 - 5.1.3 Provision of Drainage Structures, which are usually oversized (2.00m x 2.00m). Fauna crossing the motorway also uses these structures due to the arid climate of the island.
 - 5.1.4 Provision of underpasses every 2km of motorway on average. In some case underpasses, which provide for the access of

vehicles and animals (mainly sheep) are spaced every 600m. Their dimensions are usually 9m (width) and 5.30 m (height).

5.1.5 The fencing of Motorways reduced dramatically the possibility of road accidents caused by animal crossing.

5.2 Planning and implementation of the older, but even of the more recent secondary rural road network has not really catered for Habitat Fragmentation and no real practical measures have been taken. However, the fairly recent policy for the preparation of EIAs has improved the situation and some rare species of the Cyprus flora have been protected through the planning of alternative routes or in some rare cases through complete cancellation of the projects. The declaration of Areas of Nature Preservation has also helped in the protection of the rare fauna and flora of Cyprus from road or any other infrastructure.

6.0 CONCLUSION

6.1 In the case of Cyprus, the concept of sustainability has started entering all levels of spatial and socio-economic planning. Sustainability is not a strict environmental issue, but concerns all human activities and therefore the whole issue has to be tackled in an integrated and co-ordinated manner by all parties involved.

6.2 The Government of Cyprus has adopted a strong environmental agenda and all political parties support measures for the conservation and enhancement of the environment. Public concern on environmental and sustainability issues is growing and therefore the positive climate favouring a better environmental future exists.

6.3 In view of the above, there is no doubt that the unique biodiversity of the Cypriot fauna and flora will be protected and measures will be taken to minimise Habitat Fragmentation from Road Infrastructure.