

Reptiles and amphibians as target species for faunal Biogenetic Reserves

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Preface

Until recently, herpetofauna conservation has been neglected nearly completely in Europe. Apart from some local actions, reptile and amphibian habitats got no attention at either national or international level. This changed when the present project was being carried out. However, as the resulting reports were treated confidentially, this project has not been publicised widely. Because of the historical significance of the project, this paper reports on its development.

In contrast to other animals, e.g. birds, only few people are familiar with reptiles and amphibians: species are badly known, and habitats often not recognized. Therefore, this report is illustrated, showing some aspects of the comprehensive survey.

Arnhem, November 1989

Front cover: The Lowland Meadow Viper, *Vipera [virsinii] rakosiensis*,
Europe's rarest reptile. Photo: A. Stumpel.



Introduction

The reptiles and amphibians of Europe are experiencing a severe decline due to loss, degradation and fragmentation of habitat; water table lowering; pollution; direct persecution; and many other threats. Because of their ecology they are often tied to local sites and so prone to the adverse effects of even short term habitat changes, and are therefore recognized as an especially vulnerable group of animals. At the same time reptiles and amphibians can be good indicators for undisturbed natural and semi-natural habitats. A practical point is that reptiles and amphibians are relatively easy to investigate, as compared to other animals (mammals, fish, insects).

Within the Societas Europaea Herpetologica (SEH) the Conservation Committee was founded, with the aim to contribute to the conservation of the European herpetofauna. Starting with six members, later this committee grew to approx. ten members from different countries and two representatives from the International Union for the Conservation of Nature and Natural Resources (IUCN). The author represented The Netherlands, Belgium and Luxemburg in this committee.

The Conservation Committee was setting up a research program in 1981 for the conservation of the threatened European herpetofauna, after having investigated the situation in the different European countries by means of a multi-language questionnaire. Co-incidentally, at the same time the Council of Europe's Committee for the Conservation of Nature and Natural Resources (CDSN) had accepted the particular vulnerability of temperate herpetofauna and the rare and endangered status of many of the European species. Earlier, the CDSN had agreed upon a 'Critical Habitat' approach, whereby essential habitats and minimum areas are defined for separate threatened species, with subsequent reserve site recommendation, and they had drawn up a network program for European reserves: so-called Biogenetic Reserves. This led to the choice of threatened species of reptiles and amphibians as the first faunal groups for Biogenetic Reserve application. The Biogenetic Reserves had until then only been directed to vegetation assemblages. Biogenetic Reserves aim at "the conservation and protection for present and future generations of a coherent network embracing the terrestrial and aquatic ecosystems in Europe, which are typical, unique,

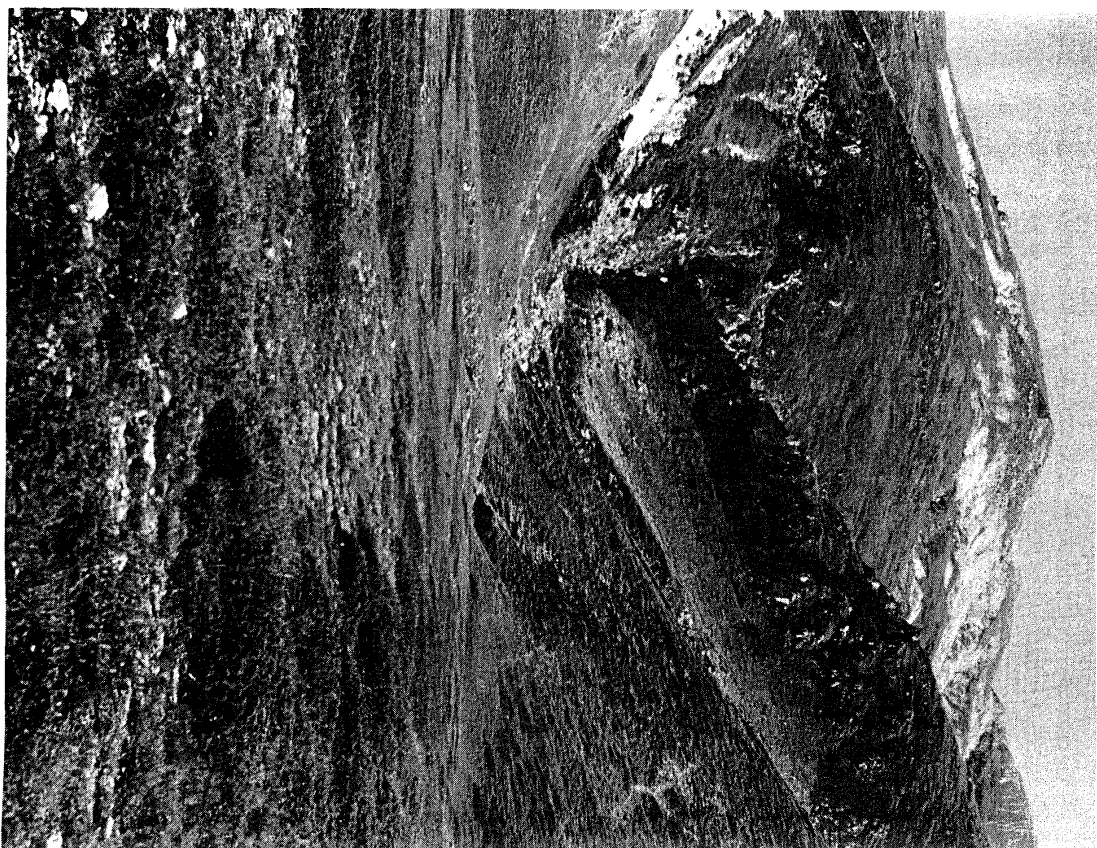


Photo 1: Typical landscape elements within the range of Orsini's Viper, *Vipera ursini ursini*, in the Central Apennines, Italy. Scene at an elevation of 1650-1750 m, showing prominent glacial and karstic features, and supporting a rich pasture with scattered mats of Dwarf Junipers. Photo: B. Groombridge.

rare, or in danger of extinction, and of the genetic material (flora and fauna) that they contain". These reserve areas must have or be granted legal status to ensure effective long-term protection. SEH offered advice and assistance, and negotiations resulted in a three-year consultancy contract with GDSN. Under this contract, SEH had to carry out research on habitat assessment for important species, with the objective to recommend key sites and areas for Biogenetic Reserve designation to safeguard endangered species and noted assemblages of herpetofaunal species. The project was restricted to the area of the member states of the Council of Europe (21 countries and the EEC). Equal and major funds were provided by the Council of Europe and by the IUCN/World Wide Fund for Nature (WWF), and additional funds came from the national WWF's of Great Britain, The Netherlands, and Switzerland, who endorsed the project.

The research work was carried out under the leadership of K.F. Corbett either by the members of the Conservation Committee or to contracted biologists. In this way the Research Institute for Nature Management (RIN) was involved, and parts of the work were registered as project 264 of the institute. During the project the Conservation Committee consisted of herpetologists from seven countries (Great Britain, Netherlands, West Germany, Sweden, Switzerland, Italy and Spain) and from IUCN. There was an important co-operation between the RIN, the SEH Conservation Committee, the Department of Animal Ecology of the Nijmegen University, the 'Niedersächsisches Landesverwaltungsamt' of Lower Saxony at Hannover, and the IUCN Species Monitoring Centre at Cambridge.



Photo 2: Habitat of the Mallorcan Midwife Toad, *Alytes muletensis*. Beginnings of a water cut erosion above torrent. Difficult habitat for predators to access, yet the one portrayed is considerably less extreme than most. Photo: R. Podloucky.

Approach

Firstly, for all species and important sub-species a conservation rating list was produced, this to select targets for conservation attention. The criteria used were: - world distribution range, - endemicity, - size of range within the Council of Europe area, - degree of rarity, decline, or threat, - vulnerability of existing or potential habitat, - scientific importance (ecologically, taxonomically, genetically). This list had an arbitrary rating of 1 to 10, whereby common species such as the Grass frog *Rana temporaria* and the Slow worm *Anguis fragilis* were assigned to 10, whilst the top rated 1 included the Marine Turtles and species such as the Mallorcan Midwife toad *Alytes muletensis* and the Meadow viper *Vipera ursinii*. The list arrived at 18 one, 24 two, and 31 three-rated species and sub-species.

Secondly, the research program started, focusing on the most threatened species. Three phases were distinguished. Phase 1 included studies where it was considered that enough information was already available to justify reserve proposals, without recourse to further field work study. Phase 2 covered the single threatened species which required varying degrees of final field assessment before any comprehensive reserve recommendation could be made. This was to be achieved by determination of the distribution, status, habitat requirements, and conservation needs. Phase 3 encompassed what was believed to be an innovative concept in herpetofaunal conservation, that of conserving relatively large areas supporting notable assemblages of herpetofauna including rarities and those threatened. It focused on species habitat utilization.

Phase 1 dealt with the Marine turtles Loggerhead *Caretta caretta* and Green turtle *Chelonia mydas*, the giant Hierro lizard *Gallotia simonyi*, the subterranean Olm *Proteus anguinus*, and the Fire-bellied toad *Bombina bombina*. These desk studies were handled by Conservation Committee members, except for the Hierro Lizard.

Phase 2 was carried out by Conservation Committee members and contracted national and local biologists. After preparations, short, but very intensive field studies were made at the different localities. This phase covered the recently discovered Mallorcan Midwife toad *Alytes muletensis*; the endemic Italian Spadefoot toad *Pelobates fuscus insubricus*; the Italian agile frog *Rana latastei*; the endemics Illford's Wall Lizard *Podarcis*

Lilfordi (different sub-species), Ibiza Wall lizard *P. pityusensis* (different sub-species), and Milos Wall lizard *P. milensis*; the montane Meadow viper *Vipera ursinii ursinii*; the lowland Meadow viper *V. [ursinii] rakosiensis*; and the endemic Milos viper *V. [lebetina] schweizeri*. Additional field work was done on the Marine turtles and the Fire-bellied toad. Table 1 lists the areas in Europe, involved in phase 1 and 2. For phase 3, study areas were selected in eastern Sardinia and eastern Greece. It involved placing research herpetologists in the field for upto a season.

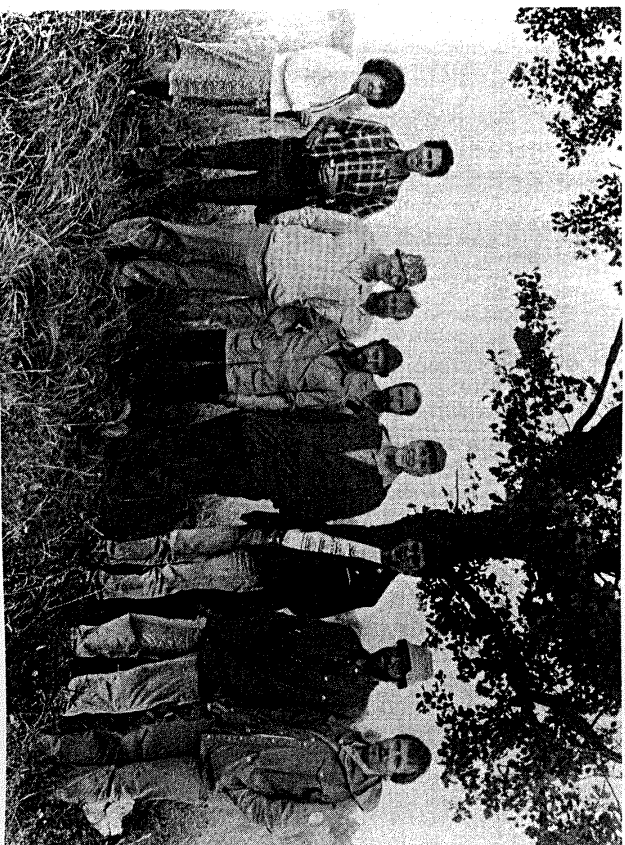


Photo 3: The 1985 assessment team at a puszta site of the Meadow Viper in Hungary. From left to right: Mrs. S. Stumpel, A. Stumpel, K. Corbett, G. Nilson, T. Fulöp, C. Andrén, M. Janisch, Z. Korsós, K. Grossenbacher, R. Podloucky. Photo: D. Stubbs.

Table 1. Research areas for the different species.

Species	Area	State
Loggerhead turtle	northern and central part of the Mediterranean	Spain, France, Italy, Greece, Turkey, Cyprus
Green turtle	eastern part of the Mediterranean	Greece, Turkey, Cyprus
Olm	East Italy, West Yugoslavia	Italy, Yugoslavia
Fire-bellied toad	East Austria, Northeast West Germany, East Denmark, South Sweden	Austria, West Germany, Denmark, Sweden
Mallorcan Midwife toad	Mallorca	Spain
Italian Spadefoot toad	Po valley	Italy
Italian Agile frog	North Italy, South Switzerland, Istria	Italy, Yugoslavia Switzerland
Hierro lizard	Hierro (Canary Islands)	Spain
Lilford's Wall lizard	small islands off the coast of Mallorca, Menorca, and Cabrera	Spain
Ibiza Wall lizard	Ibiza, Formentera, and small islands off the coasts	Spain
Milos Wall lizard	Western Cyclades	Greece
Milos Viper	Milos, Kimolos, Polyaigos, Syphnos	Greece
montane Meadow viper	Apennines, South France	Italy, France
lowland Meadow viper	East Austria, West and Central Hungary	Austria, Hungary

Results

The project resulted in proposals for 52 Biogenetic Reserves of different size, together covering approx. 200,000 ha, spread over 9 Council of Europe member states, with emphasis on southern Europe (table 2). A total number of 68 species were involved: 48 reptiles (6 Chelonians, 24 lizards, 18 snakes) and 20 amphibians (6 Caudates, 14 Anurans). For some species, as for the Olm, additional research had to be recommended to enable Biogenetic Reserve proposals in the future.

The reports have not been published. They have been confidentially handed over to the CDSN, as they contain detailed information on the last sites of species, which are threatened with total extinction. These reports are listed under the references.

The results have confirmed three significant conservation matters:

1. The threats to the species and their key sites and habitats were discovered to be worse and more urgent than was expected on the ground of available information before the field work started. It emphasizes the vulnerability of herpetofauna, and further sanctions their choice as initial target species for Biogenetic Reserve consideration.
2. The size of a reserve area has to be larger than the strict dimension of the habitat, in order to exclude negative impact from outside, i.e. a buffer zone around a site is assigned or, for the case of marine turtle breeding beaches, also the offshore assembly area of the females. Often, a whole water catchment area had to be included (or at least a relevant management unit). Also scattered pockets of habitats had to be combined into complexes, including other landscape elements.
3. The frequent occurrence of other notable and rare faunal, floral, and habitat features within the proposed reserve areas, serves to support the indicator value of herpetofaunal species. Some examples:
 - The large Biogenetic Reserve proposed on Mallorca for *Alytes muletensis* also contains rare birds breeding, such as the Black vulture *Aegypius monachus*, the Osprey *Pandion haliaetus*, and the Peregrine *Falco peregrinus*, as well as a great number of plant endemics, such as *Euphorbia maressii*, *Hippocrepis balearica*, *Pimpinella bicknelli*, and *Viola jaubertiana*.

- The remnant distribution of *Rana latastei* parallels the relicts of the riverine forests of the Po Valley, and the Biogenetic Reserve proposals therefore do likewise.
- The lowland Meadow viper reserves, proposed in Burgenland (Austria), contain the very last relicts of puszta landscape with its specific vegetation, rich in plant species and entomofauna. In the Apennines, the habitat of the montane Meadow viper overlaps with those of endemic Orthoptera.
- Areas, where marine turtles nest, sometimes also appear to be of great importance for the critically endangered Monk seal *Monachus monachus*.
- Populations of the Ibiza Wall lizard were found on small islands with important breeding colonies of the Audouin's gull *Larus audouinii*.

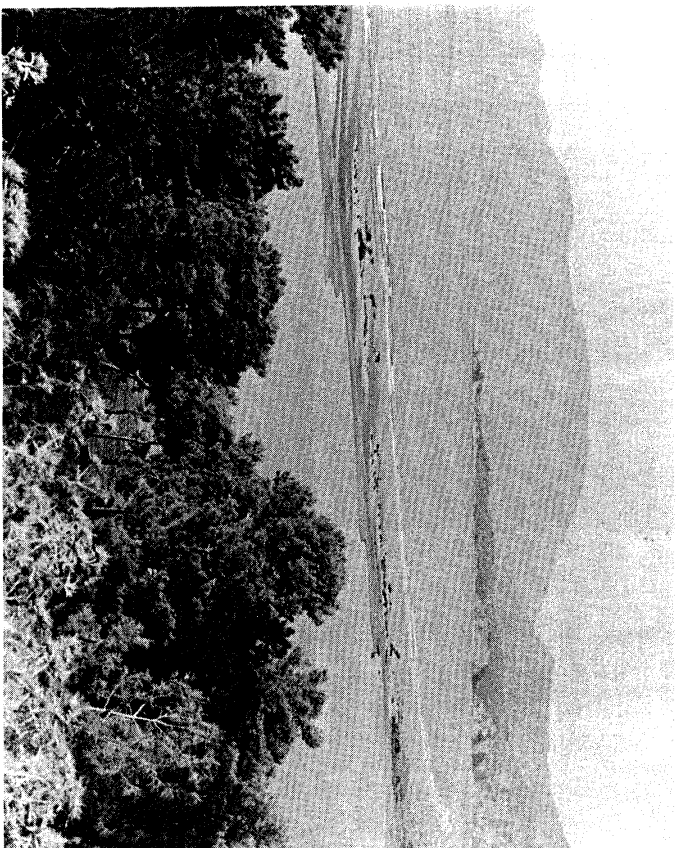


Photo 4: Nesting beach of Green and Loggerhead Turtle, 1986. Dalyan/Iztuzu, Turkey. Photo: K. Corbett.

Photo 5: Female Loggerhead Turtle on nest. Photo: K. Corbett.

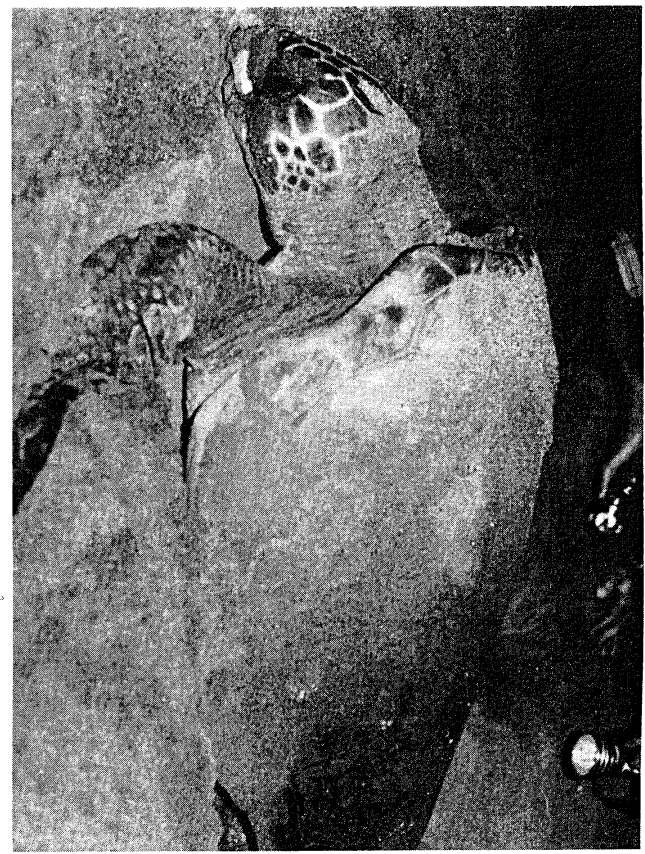


Photo 6: Nesting beach of the Loggerhead Turtle at Kalamaki, Zakynthos, Greece. Incompatible pressure of but one hotel. Its unshielded lights attract hatchlings from Lagana, 2 kms to the west. Photo: K. Corbett.

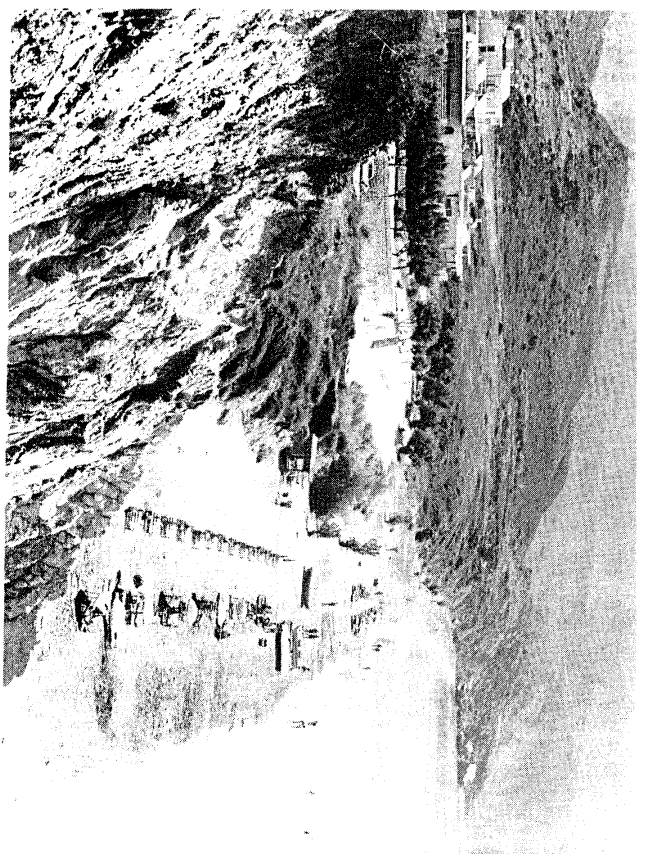


Table 2. Numbers of Biogenetic Reserves, as proposed for the selected species and areas, over the different countries. Arrows indicate the same reserves.

Species/Area	A	CH	CYP	D	DK	E	GR	I	TR
Fire-bellied toad				1	5				
Mallorcan Midwife toad						1			
Italian Agile frog		1						2	
Green turtle			3						1
			↓						↓
Loggerhead turtle			3				6	2	1
Hierro lizard						1			
Lilford's Wall lizard						15			
Ibiza Wall lizard						8			
Milos Wall lizard							1		1
							↓		↓
Milos viper									1
montane Meadow viper								1	
Lowland Meadow viper			3						
East Sardinia									1
Eyros									1
Total=52	3	1	3	1	5	25	8	6	1

The studies brought to light a great number of threats to the reptiles and amphibians, and to their habitats. All threats can be credited to man, who is taking an ever growing toll on nature by his pressure: development of land and water, intensification of land use, increased rate and frequency of disturbance, and all additional effects. Particularly in southern Europe, tourism causes much damage.

A very serious and special conservation situation within the Council of Europe area concerns the marine turtles in the central and northern Mediterranean. The vulnerability of their ancestral breeding beaches and their marine approaches to tourist developments and disturbance, and their extended period to maturity of 20 years and more, seriously questions the species' long-term future in the Mediterranean. The situation is critical, especially for the small populations left in Sicily and Sardinia. Probably the primary threat is disturbance on the nest beaches and adjacent waters, and loss of nesting habitat, but perhaps of similar importance is the accidental, but numerous catch by fishermen (long-lining for sharks and swordfish), especially around the Balearics (where possibly a major feeding area is situated). In addition, turtles and their eggs are used for food, for medical purposes, and as tourist souvenirs, and they suffer from pollution, including the effects of marine debris. An adequate and immediate protection is needed. Therefore, some of the essential habitats are proposed as Biogenetic Reserve.

Many of the other herpetofauna species, involved in this study, suffer from comparable threats. Habitat destruction and habitat degradation go almost everywhere hand in hand with opening-up of areas, which causes fragmentation and isolation of the habitats, and pollution. The impact of a number of major threats will be discussed and some examples given.

Photo 7: The Italian Spadefoot Toad, *Pelobates fuscus insubricus* (male).

Photo: F. Andreone.

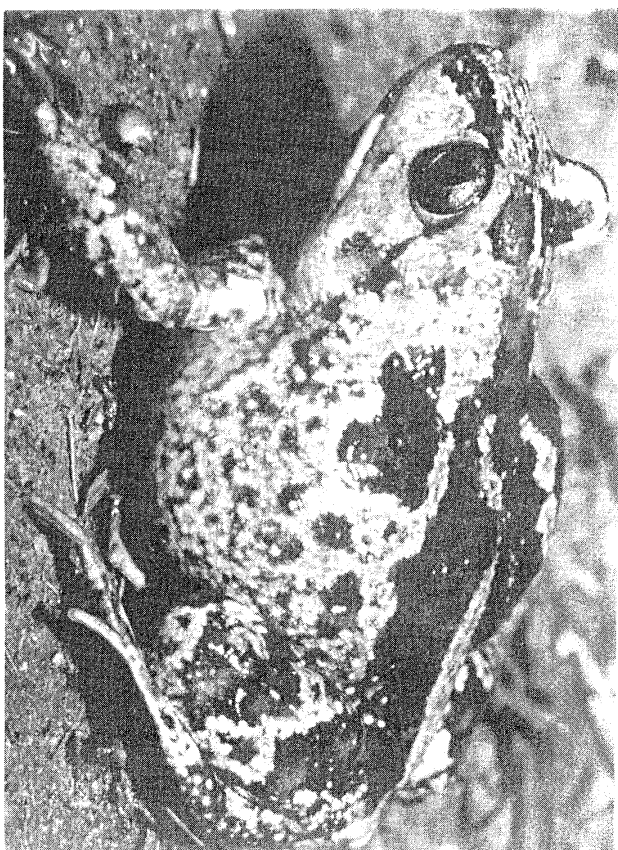
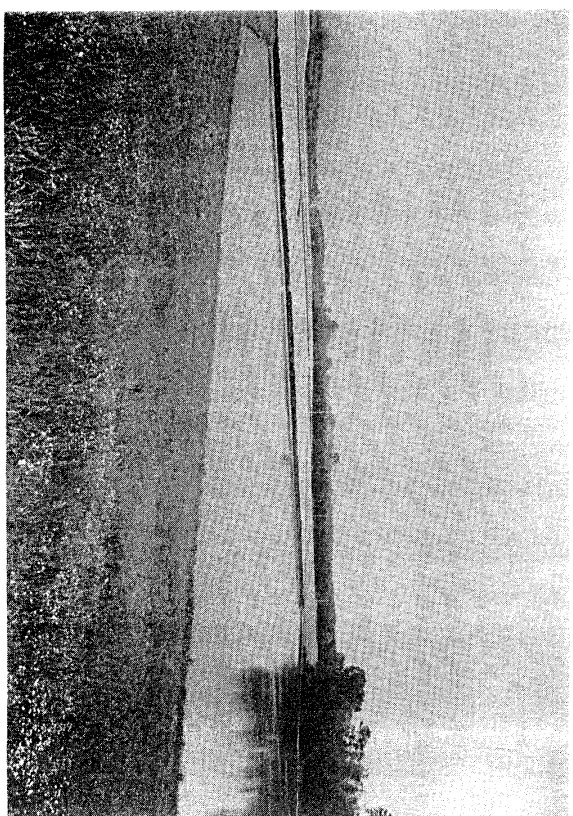


Photo 8: The rice-fields housing the Italian Spadefoot Toad are distributed over 4.5 km and located in an agricultural area which is not very intensively exploited and which is bordering humid forests along the river Ticino. Photo: K. Grossenbacher.



AGRICULTURE

Intensification of agriculture includes drainage, conversion of small fields into extended complexes, removal of small landscape elements, use of fertilizers and pesticides, burning, mechanical mowing and ploughing (e.g. for maize and sun flowers). In this way, the Fire-bellied toad and the Italian agile frog suffer from drainage and infilling of ponds; and reptile habitats along or in fields, and whole meadows disappear, as for the lowland Meadow viper.

CATTLE BREEDING AND ANIMAL HUSBANDRY

These activities are also practiced on a large scale, causing severe degradation of the vegetation by over-grazing, pollution by dung, and predation on reptiles and amphibians (i.e. by pigs and geese). On the other side, some montane areas lose their value as optimal herpetofauna-habitat by lack of low-level grazing, resulting in succession of the vegetation into shrubs and woods. Particularly in southern Europe, many nature areas are burnt down in favour of cattle breeding (maquis, open oak woods).

FORESTRY

In some parts of Europe, re-forestation takes place on a large scale, whereby the original vegetation (shrubs, deciduous woods) is removed and fast-growing coniferous trees are planted. In this way the richest European herpetofaunal communities in eastern Greece are seriously threatened. In connection with these practices, new roads are constructed, that split up areas and give access to hunters; the risk of fire increases strongly. Over-exploitation of woods opens the forest and changes the microclimate. Large-scale cutting of trees is taking place at Sardinia, and forms a serious threat to the endemic Eastern Sardinian Cave salamander (*Speleomantes supramontis*), which reaches high densities in some moist oak woods.

INFRASTRUCTURE AND INDUSTRY

Increase of human pressure leads to more exploitation of land and water. Roads are constructed, harbours, factories and quarries are built in unspoiled areas. Weekend and holiday houses are ever more penetrating into nature areas. One of the victims is Lillford's Wall lizard, who's habitats are even destroyed by dynamiting small islands to improve navigation.



Photo 9: Lush habitat within proposed Biogenetic Reserve area on West Milos. The actual habitat for the Milos Viper. Photo: D. Stubbs.

Photo 10: The Fire-bellied Toad: a vulnerable (Austria), endangered (FRG, Denmark), or extinct (Sweden) species in Western Europe.

Photo: R. Podloucky.

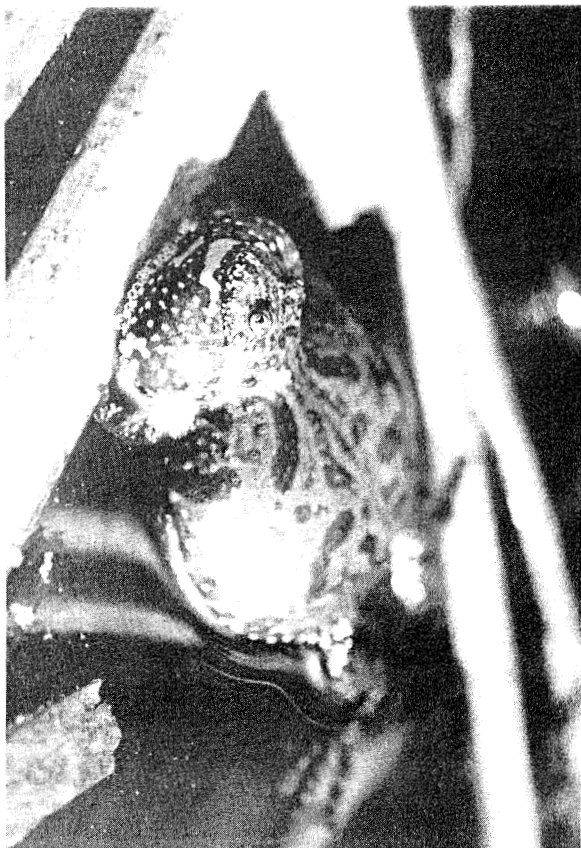


Photo 11: Sun-exposed, often large and shallow lakes or wetlands in open lowlands or flooded wetlands in river valleys are the most important biotopes of the Fire-bellied Toad. A view of the proposed Biogenetic Reserve in the river Elbe flood plain.

Photo: R. Podloucky.

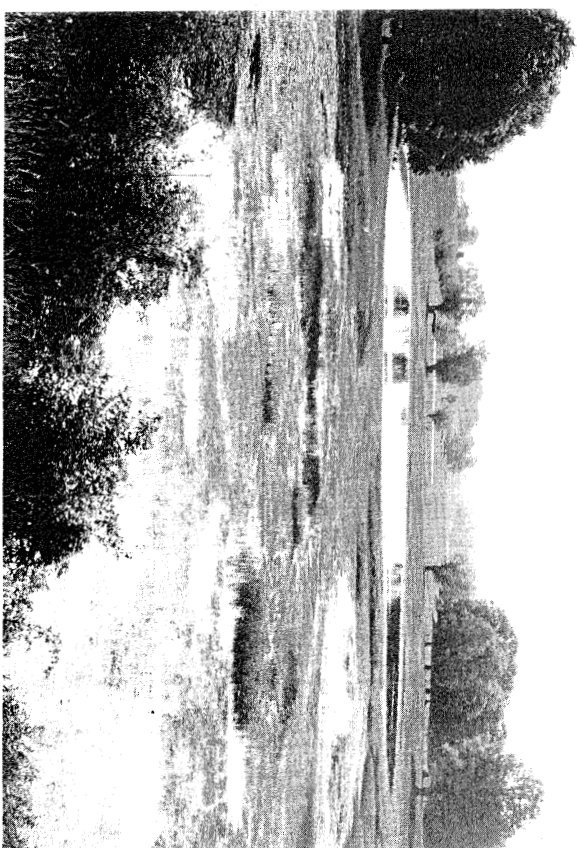


Photo 12: Open pine forest at 150 m, Evros, Greece. 9 herpetofauna species produce a biomass of 42.4 kg/ha. In case of intersection by a brook, the habitat contains 21 species, producing 73.8 kg/ha.
Photo: H. Strijbosch.

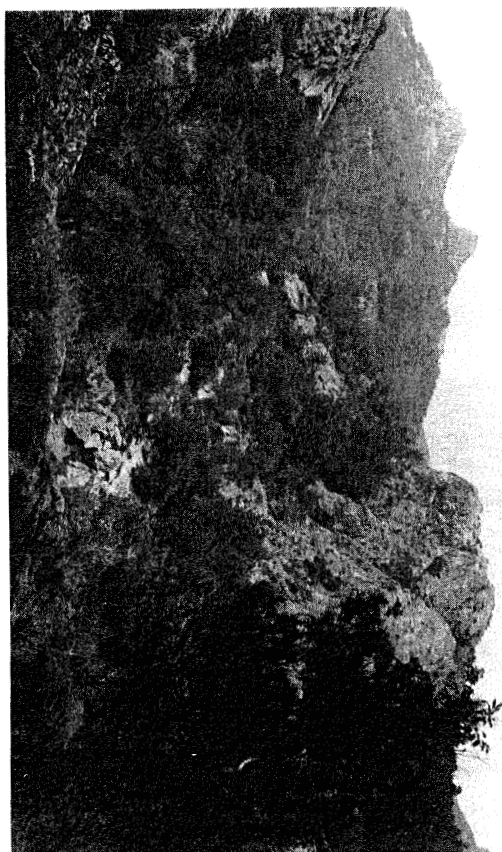


Photo 13: Interspecific relationships in Evros, Greece. Reptiles may form an important link in the food chain: collection of carapaces of the tortoises *Testudo graeca* and *T. hermanni* in one nest of the Golden Eagle. Photo: P. Scholte.

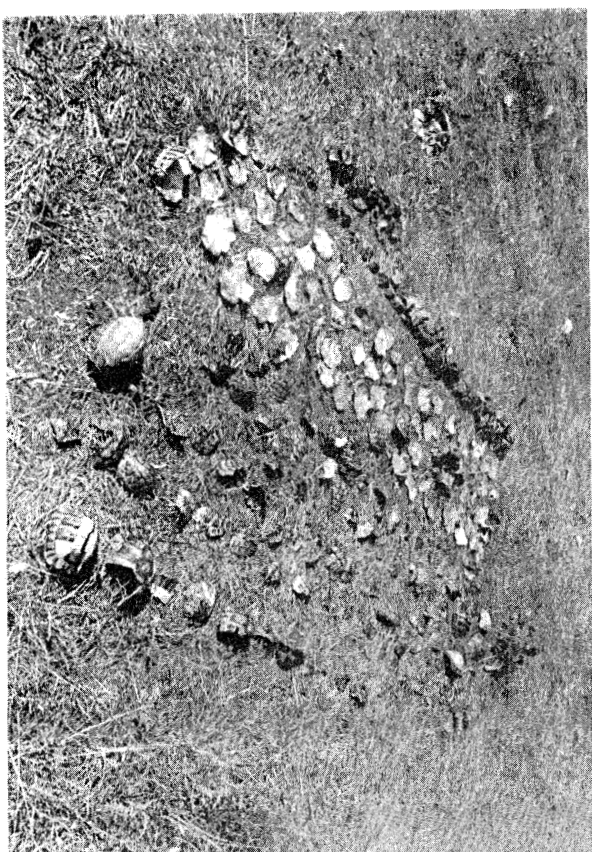


Photo 15: Amplexus (mating position) of the Italian Agile Frog, *Rana latastei*. Photo: K. Grossenbacher.

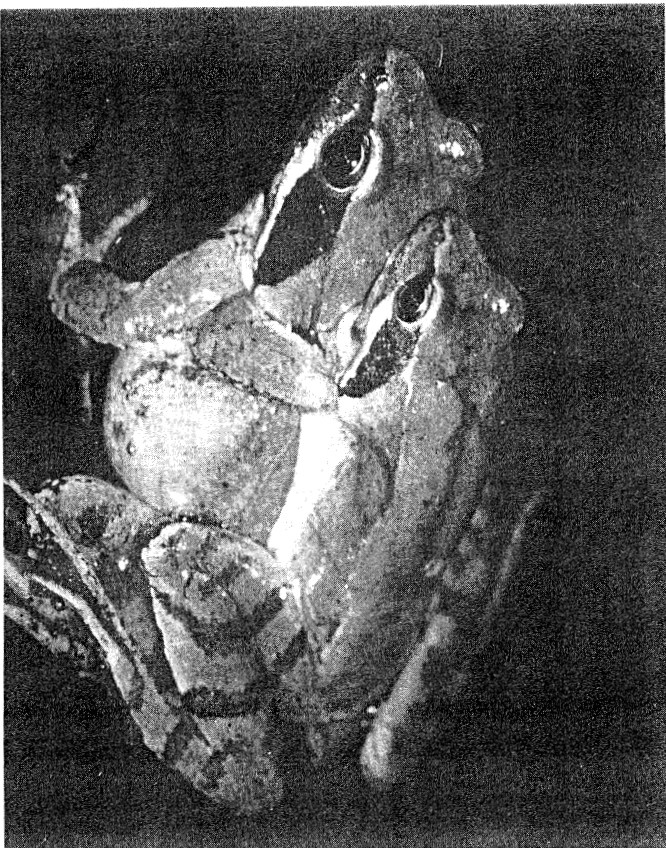


Photo 16: The river Begotta in the Reserve 'Bosco della Fontana', Nantova, Italy; an optimal habitat for *Rana latastei*. Photo: K. Grossenbacher.



TOURISM

Nowadays tourism is one of the major problems nature conservation is faced with. During the last two decades it has increased enormously and it now seriously affects the habitats of reptiles and amphibians in various ways. First of all there is habitat destruction by building tourist facilities, such as hotels, restaurants (by preference on virgin beaches), yachting harbours, watersports accommodations, ski-pistes and camping sites. Tourists are brought quite close to or into the nature that should be safeguarded. In many forms tourists disturb animals, they set fires on a large scale, they degrade habitats by treading and cross-country practice, they collect herpetofauna, they kill snakes, and their domestic animals prey upon reptiles and amphibians. Also sports like rock-climbing and speleology, that look so innocent, can cause damage. For instance, rock-climbing tourists can penetrate into the vulnerable habitat of the Mallorcan Midwife toad, and speleologists destroy the vegetation that covers the small entrances of cave systems, and so the special moist climate in the entrance zone, that is needed by Cave salamanders. A special problem is in the Balearics, where endemic lizard subspecies (developing into species) get mixed up with each other when causeways connect the islets. Ski facilities (roads, runs, jumps, pistes, lifts) are constructed on south-facing slopes in the mountains, where the Meadow viper has its last resorts. Tourists very often cause fires; the effects can be disastrous, e.g. for Land tortoises (Genus *Testudo*).

HUNTING AND SPORT-FISHING

Often measures are taken to improve the success of these activities, such as rearing and releasing game birds and sports fish, which are often predators of reptiles and amphibians. Pheasants eat reptiles, and trout do so with amphibians and their larvae.

POLLUTION

Pollution, particularly of waters, can influence the reproduction of species and change the habitat vegetation. A very sensitive animal for this is the Olm, which needs unspoiled water in its subterranean environment.

VARIOUS

A great number of other threats exist, that have a special character, or only act on a smaller or local scale. For instance, in some areas, people get bounties for killing snakes, or on islands the military are bombing reptile habitats for naval target practice. Last but not least should be mentioned the trade in reptiles and amphibians, as appeared during the study. The research on the island of Milos led to the first-ever arrest of a commercial snake collector in Greece, making people aware of the great number of reptiles that can illegally leave a country.

The projects at east Sardinia and east Greece made it possible to study more or less undisturbed and rich herpetofaunal communities in natural and semi-natural areas. Only very few of those areas have survived in Europe on places where man had no easy access, such as mountains with steep slopes, and isolated beaches with no access over land. For these areas the research projects resulted in very concrete recommendations for the boundaries and the management, based on natural population densities of reptiles and amphibians, and habitat selection in different vegetation types. In addition, the studies revealed the relationships with other rare and important animals in the areas. As development by man now threatens these areas on a short term, safeguarding and adequate management of these large areas (completely proposed as Biogenetic Reserve) is very urgent, and not only for reptiles and amphibians.

Next to the scientific results of the study, the project had also other values. As it was the first time that herpetologists of different countries worked together so intensively, there was an important exchange of conservation and management oriented information, techniques and achievements, which encourages national efforts, and leads to progress in herpetological research. Besides, the results of this study assess and try to improve the intended national herpetological relevance of the Bern Convention (Habitats), as well as on the extension of the Ramsar Convention (Wetlands) to enable herpetological site conservation.

The project resulted in proposals for Biogenetic Reserves and the management measures to be taken. The Expert Specialist Committee and the Wildlife Committee have approved and adopted the recommendations (Strasbourg, June and November 1986). These recommendations have been submitted to the Standing Committee of the Berne Convention (December 1987), who sent them to the Steering Committee of the Council of Europe (CDPE). However, CDPE returned them as they could not address specific recommendations to individual states, let alone for sites. So the concept of Biogenetic Reserves had to be deserted and efforts were made to achieve results through the Berne Convention. Therefore, of great importance was the Berne Convention meeting of December 1988, where, despite continuing objectives from Greece, 'Recommendation 13' passed. This recommendation describes urgent measures and actions for most of our proposals in terms of 'Critical Habitats'. If a country objected to a Biogenetic Reserve, then "appropriate measures" are left to them in this recommendation. It is up to the relevant countries, whether they feel the responsibility to create and manage the proposed reserves.



Photo 14: Lilford's Wall Lizard, *Podarcis lilfordi jordanii* from Moltona.
Status: rare, endangered. Photo: R. Podlounsky.

Epilogue

With this research program, only a start has been made in planning the conservation and management of the European herpetofauna. Because of restrictions in time and money a number of selected topics have been studied. However, by far the majority has not yet been so studied. Nevertheless, many species and areas clearly deserve urgent and detailed consideration, such as the Tyrrhenian Mountain lizard (*Lacerta bedriaggae*), the European Chameleon (*Chamaeleo chamaeleon*), the Pyrenean Brook salamander (*Euproctus asper*), the European Leaf-toed gecko (*Phyllodactylus europaeus*), the area of the Peloponnese with its endemics, Portugal, and most of Turkey. Besides, there is still a lot to be done on subjects we have already been working on, e.g. the Olm and the marine turtles. As the research was restricted to the Council of Europe member states, no recommendations could be made for the East-European countries, including Yugoslavia, that also have such great importance for the European herpetofauna.

In November 1989, a book on the present project has been published, edited by K. Corbett on behalf of the Conservation Committee of the Societas Europaea Herpetologica. More details, as well as descriptions of the herpetofaunal situation in all European countries can be found there.

Acknowledgements

Thanks are due to Mr. Keith Corbett for comments on the text and for improving the English.

Photo 17: Habitat of the Lowland Meadow Viper, *Vipera [ursinii] rakosiensis*, in West-Hungary. Note the profusion of flowers in this meadow scene. Photo: A. Stumpel.

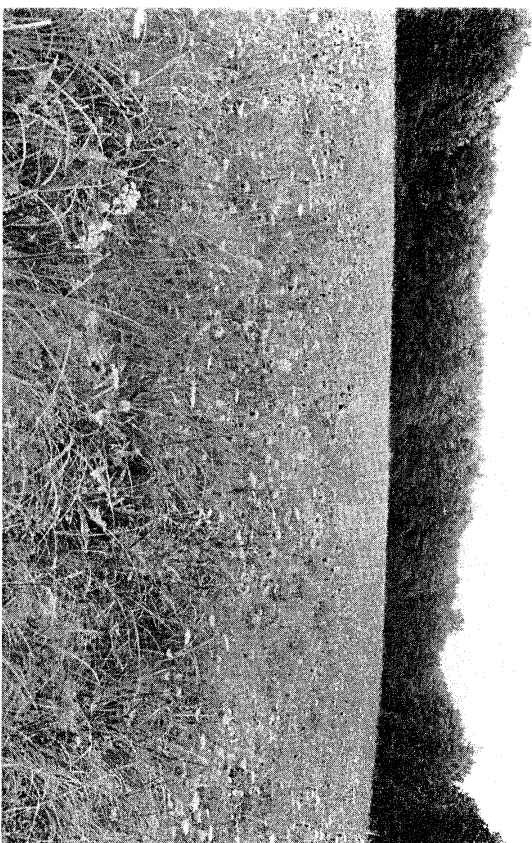
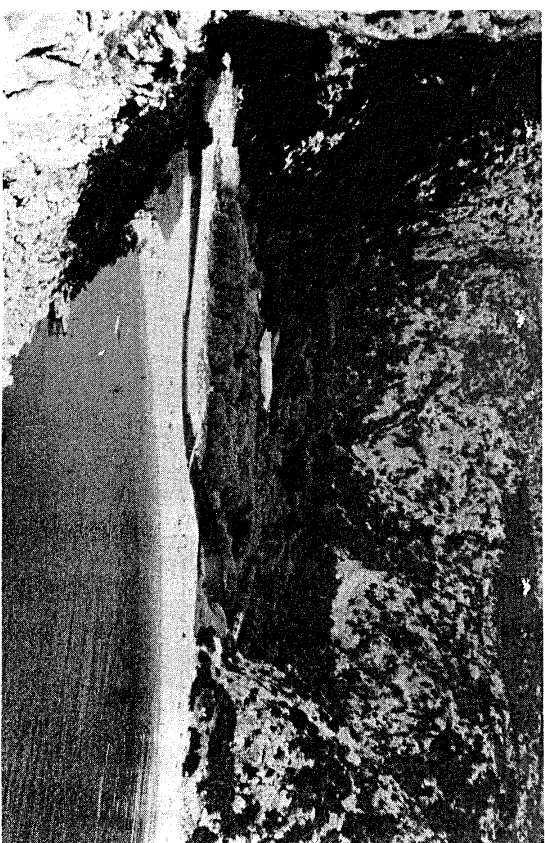


Photo 18: Tourist invasion at Cala di Luna, Sardinia, Italy. Restaurant under construction in a habitat of the Monk Seal and the Loggerhead Turtle. Situation in 1984. Photo: L. Voosenek.



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