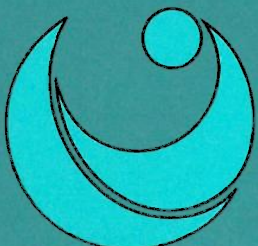


Project review of CAM 023 - Iguana management project

oppdragsmelding

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NINA

NORSK INSTITUTT FOR NATURFORSKNING

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FOREWORD

In a letter dated 4 February, 1993, NORAD asked the Norwegian Institute for Nature Research (NINA), represented by Dr. Odd Terje Sandlund, to participate in the project review of Cam 023 - Iguana Management. The project review had been decided on the annual project meeting in Managua, 18 November, 1992. The Terms of Reference for the review were also decided on this meeting.

The review team consisted, in addition to the team leader Dr. Sandlund, of Mr. Ariel J. Cajina L., and Mr. Alain K. Meyrat, of Nicaragua. The team decided to split the review among them, so that Mr. Cajina were responsible for the economical aspects, Mr. Meyrat for the environmental and rural development aspects, and Dr. Sandlund for the scientific and environmental aspects. However, the team agrees to, and are collectively responsible for the Conclusions and Recommendations given in this report.

The present report is based on preparatory review of documents, and during the period 3-13 March, 1993, field work and discussions with project staff, target groups, and NORAD staff, as well as people from other organisations and institutions, in Costa Rica and Panamá.

I take this opportunity to express my thanks to Ariel Cajina and Alain Meyrat for excellent collaboration, efficient work, and a good time, in Costa Rica and Panamá. I also want to thank Jannicke Bain of NORAD/Managua, and Vigdis Varn and Tove Stub of NORAD/Oslo, for fruitful discussions. Dr. Dagmar Werner, Ms. Daisy Rey, other Project staff, and other involved people in Panamá and Costa Rica, were of great assistance, and provided all possible help during our stay in the field. Hilde Meland, NINA, has assisted me in finalizing the report.

Trondheim, 18 April, 1993

Odd Terje Sandlund

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1 INTRODUCTION

The present Project Review was decided at the Annual Project meeting between APIV and NORAD, 18 November, 1992. The Terms of Reference are given in the Annex, Table 1.

The Green Iguana Project (Fundación Pro Iguana Verde, FPIV) was started in Panama in 1983, moved to Costa Rica in 1989 and was settled at La Avellana, Orotina, after, in 1991 it was moved and settled at its present location in La Laguna on the Rio Turrubares in the region of San José, Costa Rica. The Costa Rican project is presently organized as the Asociación Pro Iguana Verde (APIV).

The objective of the Project stated in the Concept Paper is to establish self-sustaining village-level demonstration projects based on the basic iguana management model. An interpretation of the specific problem and the management model proposed by the Project is outlined in Annex, Figure 1.

The project was originally supported by Norwegian Development Aid through IUCN, but has received bilateral support from NORAD since 1991. The contract between NORAD and APIV opens for a total support of up to NOK 20 million for the period 1991-95, and is based on the original project description (dated September 1990) and the revised Concept Paper (dated May 1991). These documents formulates the following five activities to implement the model:

- Training,
- Advisory Extension Services,
- Improvement of Technologies,
- Village Demonstration Projects, and
- Trade Controls and Marketing.

In order to assess and evaluate the activities of the Project, a program of visits and interviews of people were realized during a period of 10 days, 3-13 March, 1993 (Annex, Table 2).

This report provides a review of the project activities related to the project descriptions and work-plans, and the review-team's assessment of the feasibility of present plans. The conclusions and recommendations given below fulfill, although in a different order, the specific topics required in the Terms of Reference.

2 CONCLUSIONS

1. There is a tendency towards widening the original objective of the Project, so as to include a general wildlife management concept.
2. The strategy for the implementation of the Project has not been stated. Thus, there is no defined methodology (participatory or non-participatory) to guide the training and extension activities.
3. There is an inherent conflict between conservation and domestication of the iguana species in the project objective.
4. The approach has been heavily focussed on research, in particular regarding biological and technical problems.
5. The major biological and technical problems have now been solved, to the extent that the technology can be implemented at village and farm level.
6. The actual results of the project activities are not reported in a satisfactory way, mainly because the project wants to maintain control of the dissemination of the technology developed. This renders a detailed monitoring of the project's progress difficult.
7. Up to present the investments in the project has not benefitted the local farmers to any significant degree. Given a favourable economic analysis, the basis has, however, been established to transfer the technology of iguana production to farmers and villages.
8. There is a risk that the research investments that has been made, may provide more benefits to sectors of society which have not been defined as target groups (e.g. processors, industry-owners, brokers, etc.). The project should be reformulated to ensure that the campesinos participate actively in the processing and industry phases of production.
9. Some efforts have been made to initiate the implementation of the model in some few rural communities, one in Panamá and five in Costa Rica.
10. There has been no transfer of technology to farmers, but some transfer of the central philosophy of the project. All operations are still in the hands of the project.
11. The selection of project beneficiaries (poor rural producer groups) appear relevant. However, very few groups have so far been selected, and those who have been involved, in Panamá, have mainly acted as project staff, and not as independent farmers utilizing a new source of income.
12. The use of additional concentrate feed to increase production of released animals is the main cost component in production. The campesinos appear not to accept that this is a necessary element of production, and they will consequently try to use less than the amounts of concentrate recommended by the Project.
13. A realistic economical analysis of the various parts of a practical implementation, and of alternative models, is still lacking.
14. The lack of proper economic feasibility and marketing development studies are serious constraints to an realistic assessment of the sustainability of the project.
15. The economic feasibility and marketing studies defined in "Iguana Management: A Model for Rural Development", September, 1990 (by Dr. Dagmar Werner), are not the most relevant studies required to assess the economic feasibility of the Project.
16. The high economic profitability of the operation assumed by the Project authorities is probably not correct. The prices of final products (meat and leather) are most certainly overestimated.

17. Special consultancies are needed to analyze the economic feasibility, in particular regarding incubation and breeding of juveniles for release, and production on the individual farm or village. The analysis must be based on realistic prices of 7-month old animals from the Center, or from local incubation and rearing units, and on realistic prices of final products.
18. The lack of implementation of the iguana production at the campesino level, makes it difficult to evaluate the production parameters assumed by the Project.
19. The production model defined in the project, where the Center will monopolize the production and sale of young iguana to campesinos for raising, is not feasible. For example, some of the iguana raisers working in Panamá hope to perform the total production cycle when they become private iguana producers.
20. At the Iguana Center, the research costs are mixed with the production costs. This situation causes an overestimation of the production costs.
21. The present lack of trade in final products (meat and leather), both at the local and the international level, makes the marketing of iguana products at any significant scale a high-risk operation.
22. The marketing of products coming from wild animals classified as "endangered species", will, even when the animals are grown in captivity, risk a confrontation with social sectors in developed countries (e.g. conservation or animal rights groups).
23. The present international market in iguana products only includes iguanas as pets. Although the animals stems from breeding in captivity, the trade must comply with CITES regulations.
24. There is real market for iguana meat at the national level in Panamá and Costa Rica, although neither the actual nor the potential size of the market is not known. Analyses of the national markets are lacking.
25. International as well as national markets depend on legal aspects in the respective countries. Some efforts have been made in the analysis of the legal matters related to trade in iguana products within countries, but little progress have been made in policy building regarding the commercial use of natural resources in Panamá and Costa Rica.
26. It is important to develop artesanal tanning procedures for iguana leather, both to obtain the real cost of the procedures and to build a price at the national and international leather market. These aspects are fundamental to a complete economic feasibility study, and to define a national or international market for iguana leather.
27. The staff involved in the Project implementation appear to be over-dimensioned compared with the results obtained so far. For example, there are four lawyers engaged in the Project, but the progress concerning legal matters and policy building is small.
28. There is no official link with the most relevant government authorities (environment, forestry, agriculture) in Costa Rica or Panamá.
29. Cooperation and coordination with other similar projects is weak.

3 RECOMMENDATIONS

1. The original objective of the Project should be maintained and emphasized. The objective should not be widened to include a general wildlife management aspect. A clarification of the identity, purpose and limitations of the Project will facilitate a proper identification of the relevant strategy, activities, and methodology.
2. To solve the conflict between conservation and domestication, it may be feasible to distinguish clearly between iguana populations managed for exploitation, and populations in conserved areas.
3. The different components of the Project should be more clearly defined so that the various activities can be assigned to the respective Project components. The intention would be to simplify planning, management, and collection of economic data.
4. Each Project component should be linked to a specific objective.
5. It is important to define a Project strategy and methodology to accomplish the proposed goal in the rural development component.
6. The stage of biological and technical research should now be over, and the practical implementation at the village level together with thorough and realistic studies on the economic feasibility should be given priority.
7. The Project should be implemented as soon as possible at the village and campesino level. The implementation should ensure that the village and individual campesino are in left in control of the whole production process.
8. A plan should be drawn up for a real transfer of the iguana breeding technology to local communities.
9. To make the results publicly known at a faster rate, a series of technical reports (in Spanish) should be initiated. Simple summaries should be legible for laymen. This does not exclude subsequent international publication.
10. Collection of data needed to describe the different components of production costs should be started immediately. This is required to perform realistic estimates of the costs and profits of the activity.
11. The budgets and accounts for research and production at the Iguana Center should be clearly separated. This will enable the calculation of real cost figures for hatching and production up to 7-months old iguanas.
12. Work to develop the processing phase at the village level should be started as soon as possible. This involves for example teaching community women the tanning process and iguana leather handcraft to ensure that the added value remains in the local communities.
13. A thorough economic analysis of the various modes and stages of the model to be implemented, should be given the highest priority; i.e. the profitability of juvenile iguana production at the Center, and in different alternatives of village production systems.
14. Special consultancies are needed in the areas of economic feasibility, in particular regarding incubation and breeding of juveniles for release, and production on the individual farm or village, based on a realistic price of 7-month old animals from the Center, or a local incubation and rearing unit.
15. The project should not extend its activities to other countries (like Guatemala and Nicaragua), until the project model has been realistically implemented in Panamá and Costa Rica, and is shown to be economically sustainable.
16. A national market analysis, together with an analysis of the legal matters related to trade in iguana products within Panamá and Costa Rica should be given priority.

17. Production and marketing of the final iguana products (meat and leather) should be started as soon as possible at a small scale. This will facilitate analyses of economics and market developments based upon more realistic information on consumer acceptance.
18. International trade of wild animals must comply with national and CITES regulations, and we would advise against spending too many resources on the sector of international trade at present.
19. An efficient reorganisation of Project components and activities (cf. Recommendation 3 above), followed by a proper definition of the functions for different positions, may facilitate a reduction in the number of staff at the Project.
20. The professional project staff should be stabilized by means of longer-term contracts, to ensure the continued activity independent of single key persons.
21. At present the investments in the Training Center should be restricted to the necessary structures to serve the extension work and transfer of technology to local communities.
22. Investments in veterinarian equipment should be restricted to those items that are strictly necessary to develop the ongoing collaboration with the Veterinary School of The National University. Equipment already at hand at the Veterinary School campus should not be duplicated. This point may be re-evaluated after the training of the project veterinarian, when a better assessment of needs may be possible (see next point).
23. There is no veterinarian with special skills in reptile health in Costa Rica and possibly in Central America, and training of the Project veterinarian should therefore be given priority. The veterinarian should be offered a full time contract, with proper rights and obligations, to ensure that the competence gained by training abroad will benefit the Project.

4 FINDINGS

4.1 PROJECT DESIGN

4.1.1 Objective, Components and Strategy

The purpose of the Project "Iguana Management: A Model for Rural Development" is described in the original Project Proposal and in the Concept Paper. The purpose is the application of a model for rural development which has immediate benefits for the conservation of living natural resources at the village level. Both documents also state that "the principal objective of this program is to establish self-sustained village-level demonstration projects based on the basic iguana management model".

In the draft version (not official) of the Terms of Reference for the Project Review, 1993 "the objective of the Iguana Management Project is to achieve a sustainable utilization of the natural resources by including tropical forest and wildlife management procedures into farming systems. Iguana management is utilized as a mean to accomplish this goal".

In the Terms of Reference for the Project Review, 1993 of CAM 023-Iguana Management Project (Annex, Table 1), it is stated that "the objective of the Project is to obtain sustainable utilization of natural resources by including management of tropical forest and wildlife, with emphasis on green iguanas".

Thus, over time, there is a tendency to widen the objective of the Project. This should be avoided. The original principal objective is fairly well defined, and should be maintained until at least a few demonstrative models have been established to show that wildlife management (exemplified by iguanas) can be profitable, while at the same time serving the conservation of natural resources at the village level.

According to the originally stated purpose of the Project, the general objective can be formulated as follows:

- to implement a model for rural development of immediate benefits for the conservation of living resources at village level, through the re-establishment of green iguana populations for sustainable harvesting.

In addition to this, it may be feasible to formulate a more detailed objective for each component of the Project, in order to express the identity, purpose and limitations in relation to the activities, strategy and methodology chosen to implement the Project.

Our review of the past, present and planned activities of the Project reveals five main groups of activities, which are listed below.

A. Administration

- Personnel
- Operations in Costa Rica
- Operations in Panamá

B. Research and Development

- Biological Research
- Special Studies (Economics, Marketing and Legal)

C. Rearing and Production of Iguanas

D. Training (Transfer of Technology)

E. Establishment of Villager Production System

- In Costa Rica
- In Panamá

If these main groups of activities are adopted as the components of the Project, it will facilitate the annual

planning, the administration, and particularly a system for collection of data necessary for analysis of the economical feasibility of the various elements of the operation. This set-up will separate the system for production of juvenile iguanas at the Iguana Center from the biological and technical research, and the different production systems of the villagers in the two countries will be kept separate. As mentioned above, it may also be useful if each established component of the Project is guided by a specific objective. As an example, for component E. Establishment of Villager Production System, a tentative specific objective may be:

- to develop with the villagers a sustainable farming system which include the management of iguana and forest as a demonstration of wildlife management.

Although there are adequate strategies for the biological research, and there is a model for iguana management, a strategy for the rural development aspect of the Project is still lacking. It is generally accepted among specialists in this field of work all over the world that the participatory strategy is most successful to enhance sustainable development in the local communities. This means that the project beneficiaries are directly involved, and are given responsibilities in the project activities.

4.1.2 Conservation versus Domestication.

It is important to be aware that inherent in the purpose of the project as stated in the original project documents is a conflict between the conservation goals and the domestication of the green iguana. To re-establish species populations in the wild as a conservation measure, one has to consider the genetic variation in the population. Unless offspring of the local population is available for re-introduction, the introduced stock should preferably have a wide genetic variation, to provide an adequate basis for natural selection.

In contrast, in captive breeding there is a need to increase survival and production, to attain economic sustainability of the operation. This inevitably leads to an "artificial" selection pressure, which may be termed domestication. A continued release of animals from captive breeding will produce a semi-domesticated population in the wild.

Parameters which easily may be subject to selection in captivity are for instance size and number of eggs in females. In a protected environment, many eggs may for economical reasons be a preferred character. However, the great variation in both egg size and egg number observed in wild populations indicates that the fitness of the animals related to these characters varies in nature. Consequently, to establish and maintain well-adapted wild populations, large variation should be ensured. To attain economic sustainability some selection may have to occur in the captive and managed populations, whereas populations as close as possible to the "natural" state should be re-established in conserved areas (national parks, etc.).

This conflict may not be easily resolved during the practical implementation of the project. Thus, re-establishment of iguana populations in conserved areas should be considered an activity separate from the activity to establish village production systems based on iguanas.

4.2 ORGANIZATIONAL ASPECTS

4.2.1 The role of Fundación and Asociación Pro Iguana Verde

The project is implemented through two overlapping organisations: Fundación and Asociación Pro Iguana Verde. The Fundación (FPIV) was established while the project was still working in Panama, whereas the Asociación (APIV) was established in 1991 in response to the request by NORAD for a broader governance structure. It was seen as a problem that too many decisions concerning both short and long term development of the project rested in the hands of one person (Dr. Dagmar Werner). The same point was made by IUCN in 1989, while they were the executing agent for the Norwegian support to the project.

In practical terms, the daily operations of the project have probably not changed much through the establishment of APIV. However, as APIV has gained status as a public utility institution in Costa Rica, this simplifies many

practical aspects of operation for the project. FPIV, as a Panamanian institution, cannot attain this status in Costa Rica.

The governing council of APIV appears to have a more international composition than necessary for the practical implementation of iguana management in local communities in Central America. We would propose that some of the international experts of the governing council are replaced by representatives for the Costa Rican authorities dealing with the relevant sectors, such as environment, forestry and agriculture. A formal collaboration with these authorities appears at present to be lacking.

4.2.2 Administration

Personnel

The review team obtained the clear impression that in reality, the establishment of APIV has not changed the daily operations of the project. It is still very much dependent on the leading hand of Dr. Werner. The centralization of decisions and main operations will not benefit the development of each of the components. A centralized model for Project management will rather reduce the ability of the Project to cope with the complex situation when all the activities are running. However, as the professional project personnel in the various areas of activity stabilizes, the team will probably be able to deal with the problems arising should the project leader for some reason become incapable. In this connection, it is important that the project personnel through contracts are engaged on a permanent basis so that the staff stabilizes, and that the personnel are given responsibilities within their respective Project components.

The project personnel now appear to include professionals to cover most areas of activity. However, some key areas where professional personnel are still lacking are marketing, economy, and training (environmental education).

The staff involved in the Project implementation appear to be somewhat too large if one considers the results reached so far (see Annex, Table 3). For example there are 4 lawyers (equivalent to 2 full time positions), but there is little advance in the analyses of legal aspects and almost nothing done in the natural resources policy building. In order to patrol the Iguana Reserve and to watch the Iguana Center there are 13 guards. In addition there are eight iguana helpers and five constructors, only in Turrubares.

Construction and Operations of the Center in Costa Rica

The implementation of the project depends on adequate physical facilities as well as biological and technical know-how.

APIV is localized at Rio Turrubares, in the buffer zone between Carara Biological Reserve and Turrubares Forest Reserve. FPIV has leased approximately 400 ha from the Institute of Agrarian Development (IDA) on a 20 year basis. This area forms the Iguana Reserve, creating a corridor of conserved lands between the Carara and Turrubares reserves, along Rio Turrubares. The Iguana Reserve is adjacent to several farming communities, which are being involved in collaboration with APIV. This area appears well suited for the purpose.

Substantial funds have been invested in the Iguana Conservation and Development Center (ICDC), which includes laboratories, dormitories, workshop, and iguana cages for experiments and production, as well as the Iguana Reserve. There are plans to erect an education center including lecture hall with library and laboratory, visitor shelter, shop, and demonstration cage, at a total cost of some USD 250,000. Approximately USD 135,000 is presently available towards this end (USD 77,100 from NORAD). An alternative is to erect a simpler structure to cover only the immediate needs in relation to training of the local farmers, and to serve visitors (demonstration cage, handcraft shop).

There are also plans to equip a veterinary laboratory at the site, to facilitate research into the preventive veterinary medicine of green iguanas. The investments are estimated at approx. USD 12,000.

Presently, the activities at ICDC are mainly concerned with research on breeding of iguanas and the ecology and nutrition of iguanas released in the Reserve. Altogether 30 persons are involved in these activities. In addition, 2 persons are involved in extension work in the local communities in Turrubares. This activity has so far mainly included reforestation (tree nurseries), forest fire prevention and combat, and motivation for iguana management. Plans are to release iguanas in the farmers' parcels during 1993.

The establishment of the Iguana Reserve is claimed to necessitate a labour-intensive activity to protect the area against poaching and forest fires.

Operations in Panamá

In Llano Grande de Ocú, Panamá, the project have been operating since 1988. At the project's disposal are a unit for incubation and rearing of juveniles, and a forested area along a river where the ecology and nutrition of iguanas in the wild is investigated. The operations are run by engaged personnel, and a number of local campesinos (small farmers) are engaged to produce iguanas on their properties, mainly in their patios (backyards).

The production of juveniles is largely based on the collection of gravid females from the farmers' patios so that the eggs are laid under control in the cages. After incubation, the juveniles are reared to an age of 7 months, when they are released either into the farmers' patios or in the research zone. The iguanas' food is supplemented by various amounts of concentrate in the farmers' patios, and in the research zone.

4.3 RESEARCH AND TECHNICAL RESULTS

4.3.1 Biological Research

The biological research in the project have covered i.a. the following aspects: iguana fecundity, incubation, hatching, nutrition of young and adults in captivity, diseases, ecology of adults in the wild, the effect of additional feeding with concentrate feed in the wild, and mortality in the wild and in captivity. In most of these areas, results are said to be available. However, there is an unsatisfactory degree of reporting of results. There is high expectation of different governmental and non governmental institutions to receive from FPIV the technical knowledge to be applied in iguana management as an alternative activity for rural development projects.

The technology for production of juvenile iguanas for release in the forest appears largely to be clear. Available figures show that mortality of eggs during incubation, as well as from hatching to release at an age of 7 months is down to 5%. Any further gain in this part of the production cycle will therefore be marginal. Some improvement may still be made in the number of viable eggs from each female, but this would also have only minor impact on the economic sustainability of the operation. The major aspects of iguana ecology, in particular feeding ecology, in the wild is also fairly well known. For the practical implementation of iguana production in farmers patios or forest patches, the level of knowledge is more than adequate.

Mortality in captivity is very low, indicating that diseases is not a major problem. However, epidemics do occur, killing a high number of hatchlings in some batches. Experience from intensive culture of other animal species also shows that previously unknown diseases will appear and create problems. The best way to reduce this problem is to establish a good health monitoring system for the captive breeding. In this field, basic knowledge may still not be adequate. However, the recorded data from nearly ten years of research have not been properly analyzed, and a detailed planning of a research programme on iguana health should be based on an appraisal of these results.

The amount of data on file in the project is claimed to be so large that no available database have up to now been capable of handling it all. The collaboration with the Veterinary School to develop the VAMPP programme, which is presently used to monitor milk production in Costa Rica, may remediate this problem. According to information given by the computer experts at the Veterinary School, this software is highly efficient in quick handling of large amounts of data. This, however, remains still to be seen. The VAMPP-Iguana was said to be

ready for running within a few weeks. Although a great deal of caution is justified regarding computer "promise-ware", we may assume that the software will function as promised. If so, it should immediately be put to use in sorting out the results of nearly ten years of research. Summaries in the various aspects of iguana ecology and rearing should then be made generally available, preferably in the form of technical reports. This would facilitate an evaluation of which, if any, biological problems remain to be solved related to the practical implementation of the Project.

The ongoing experiments regarding the nutrition of released iguanas are based on providing varying amounts of additional feed concentrate, from no addition to feeding stations every 10 m. The results from these experiments are essential in the economic feasibility analysis to be performed. There is also a need for some systematic collection of data on the effect of additional feeding with household waste, waste from vegetable production, etc. This is an option for additional feeding which probably will be chosen by many farmers.

4.3.2 Rearing and Production of Iguanas.

The physical facilities at the Iguana Conservation Centre at Turrubares have during 1991-92 been developed into a unit able to produce some 30,000 7-months old iguanas for release. The incubation and rearing unit in Llano Grande has a capacity of approximately 7,000 7-months old.

The production of iguanas from release as 7-months olds is based on natural food supplemented by feed concentrate. By this method, the density of iguanas in a patch of forest can be kept high. However, the concentrate is expensive, and a closer investigation of possible production levels excluding concentrate would have been useful. It was mentioned by farmers in Panamá that the natural food in the forest could be supplemented by all kinds of waste from vegetable production and plant waste from the household.

At the village level, the model implies that the farmers shall use their patios or small forest patches as habitat for iguanas. Research has established a number of suitable native tree species to serve as shelter and food for iguanas. Some of these trees are fruit trees, but the production of fruit from an iguana forest will be greatly reduced, as iguanas feed on both flowers and fruits.

4.3.3 Dissemination of Technology.

In the project plans, it is envisaged that the technology for incubation and captive breeding of juveniles should be kept within and controlled by the APIV/FPIV project. The arguments are that a liberal distribution of this technology will favour commercial interests, which subsequently will dominate the production of iguanas without any regard to the conservation aspects of the operation. If there is a highly profitable market for iguana products, it appears unlikely that commercial interests can be excluded from the production. A tagging system for identification of legally produced iguana skins has been envisaged, but in our view, this will be difficult to control and will also add costs to the production.

Anyhow, development of a highly profitable market will probably pose a serious threat to wild iguana populations, and encourage poaching. On the other hand, local production in a many villages to cover local and national markets may render illegal exploitation of wild populations unprofitable.

The products presently envisaged from iguanas are meat, skins, and live animals (as pets). Iguana meat is traditionally appreciated in many parts of Central America, but it appears unlikely that it will become anything but a niche product in other parts of the world. There is a certain market for skins, but the skin of green iguana appears less attractive than many other reptile skins. There is at present a certain market in the US for iguanas as pets. Animals are mainly supplied by producers in Nicaragua and El Salvador. Available information indicates, however, that this market is small, with prices fluctuating from profitable to clearly unprofitable, depending on supply from the suppliers in Nicaragua and El Salvador.

A market analysis for the national markets, together with an analysis of the legal matters related to trade in iguana products within countries should be given priority. International trade in these must comply with ICES

regulations, and we would advice against spending too many resources on the international trade at present.

4.4 ECONOMIC EVALUATION

The economic aspects of the Project are evaluated in two parts. The first part deals with the economic and marketing aspects of the project document "Iguana Management: a Model for Rural Development", by Dr. Dagmar Werner, September 1990. The second part evaluates the current activities related to the socio-economic sustainability of the Project.

4.4.1 Evaluation of the Economic and Marketing Aspects of the Project

The economic and marketing components specified in the Project document are the following:

1. Economic feasibility
2. Development of market controls
3. Market development

To implement these components a total budget of USD 350,000 has been proposed, to be covered by funds from NORAD. The total budget has been distributed over the years 1991-1995 in the following manner (in USD 1000).

YEAR	1991	1992	1993	1994	1995	TOTAL
AMOUNT	75	101	71	53	50	350

For each of the above components, specific activities are presented, to be implemented in each year during the 1991-1995 period. At present, most of the economic and marketing activities which, according to the plans, were to be performed during 1991 and 1992, have still not been implemented. A detailed review is given in Annex, Table 4. In general, it appears that the project has a two years delay in the implementation of economic and marketing activities.

There are different reasons for the delay in implementation. First, the technical and research activities have been given priority in the implementation of the whole project. Second, it appears as if the interest in implementing the economic and marketing activities has not been sufficient. The justification presented by the project authorities, is that it has been difficult to find an economist to take charge of these activities. However, this should not be the case in Costa Rica, where human resources with the adequate skills are likely to be more easily available than in any other country in the region. In addition, an economic model was developed for iguana verde production in 1986 by Dr. Lindie Nelson, an economic analysis specialist from Winrock International. However, this model has not been validated with the data generated during the many years of project work.

Finally, it should also be pointed out that the economic and marketing activities considered in the the original project documents are not well defined in order to know the actual economic feasibility of the project. The activities defined are mainly related to theoretical analysis of aggregate demand for products that have never been traded in large volumes in any market. For example, the iguana verde leather which is considered the most important final product, and should account for 93% of the total created income, has never been traded in significant volumes. This is also pointed out in the project document: "Iguana skin has not traditionally been traded internationally". Is not adequate to base an estimate of consumer demand on products that have never been tested in the market.

On the other hand, activities important for estimating production costs in the Center as well as at the campesino level were not defined in the project document. Neither is there any consideration of activities related to processing and marketing of iguana products on a small scale during the first year of project implementation. These have to be included to monitor consumer acceptance and product quality if a stable market is to be developed.

4.4.2 Evaluation of Implemented Activities Related to the Socio-economic Sustainability of the Project

At present, the evaluation of the economic aspects of the implemented project elements are related to the estimates of the total created income potentially generated with the total implementation of the Project.

The results obtained are related to the production costs, the production model, and the gross income, net income, gross margin at the leather industry, gross margin at the meat industry, total net income for campesino, and net income related to other campesino crops (Annex, Tables 5 - 12). These variables must be identified to facilitate a study of the economic feasibility of the Project. However, the results obtained up to now are not sufficient for this purpose. Most of the data applied are based on assumptions which have not been validated under real production and marketing conditions.

First, the iguana verde leather retail price used to estimate the gross income is based on the assumption that consumers at the retail level will pay 60% of the price obtained for tupinami leather. This gives a retail price for iguana verde leather of USD 50. Subsequently, this price is used to estimate the total created income from the project implementation, giving a total of USD 9.8 millions (see Annex, Figure 2). The assumptions leading up to this figure are too uncertain to allow the use of this figure as a reliable parameter.

Second, when estimating the gross income from production at the farm level, it is assumed that 92% of the value is added during the processing of meat and skins and the marketing process (see Annex, Table 8). If this is correct, it means that the major investments into research in the biological production process (nutrition, health, genetics, hatching, etc.) are creating relatively small income opportunities at the farm and village level. The investments will mainly benefit other sectors of society than the ones which were considered in the project document, such as processors, industry owners, and brokers (see Annex, Figure 2). However, the whole calculation of gross income is too theoretical to be trusted whether at the farm level or at the Project level.

Third, the available data for production costs during the different production phases are not reliable. The production cost figures available for incubation, hatching, and breeding until 7-months age at the center are not based on realistic figures, as the various activities at the Center are not accounted for separately. The estimated production cost for a 7-months old iguana raised at the center is USD 2.50, but there are no realistic data available for the different cost components. For example, the daily consumption of feed per iguana appears not to be recorded properly. The figures presented by the project authorities upon request were changed three times. First, the daily consumption rate per animal was said to be 20 g, then it was changed to 15 g, and the final figure we obtained was 10 g.

The feeding component is very important for the calculation of total cost, as it usually constitutes more than 60% of the total production costs in animal production systems. If we assume a daily consumption rate of 10 g, the total feed required to raise an iguana up to 7 months will be about 2.1 kg. The price of feed concentrate in Costa Rica is approximately USD 0.27 per kg (USD 12.00 per 100 pounds or 45 kg). Consequently, the feeding cost for producing a 7-months old iguana at the Center will be about USD 0.60. This equals 24% of the total production cost of USD 2.50, which appears to be too low, even if we assume a higher efficiency in feed utilization in iguanas than in mammals or birds. On the other hand, 100 pounds of concentrate cost USD 22.00 in Panamá, giving a feeding cost at the breeding station in Panamá of about USD 1.00. If we assume that the other cost components are similar to those of Costa Rica, the iguana production cost will be higher in Panamá.

In any case, it appears that the total production cost at the breeding centers have been overestimated. The reason is that much of the research cost, for example the salaries of the veterinarian and nutritionist, are charged on the iguana production. These positions are, however, mainly occupied with research. Moreover, the cost of raising iguana at the Center appears too high if we compare the cost per unit of weight gained at the Center and during the campesino's production. The weight gain of an iguana during the 7 months at the breeding center is 150 g, with a total cost of USD 2.50. The cost per 100 g is consequently approximately USD 1.70, or USD 7.50 per pound. The estimated production cost during the campesino's phase of the production cycle will be USD 1.50, while the iguana's weight will increase from 150 g up to 3.0 kg. The production cost of iguana during the campesino phase will be USD 0.05, or USD 0.24 per pound. This difference, which means that production costs at the breeding center is more than 30 times higher than during the campesino's phase, appears too large even

if we keep in mind that the production costs at the Center also includes incubation and hatching, which are periodically labour-intensive operations.

Other important components related to the financial aspects of the operation are not considered in the general model (see Annex, Figure 2). The project budget do not include investment costs neither for production nor for processing. It is impossible to evaluate the sustainability of the project without knowing how the production, processing and marketing activities will be financed. In other words, the funds needed by the campesino to make the necessary investments in the iguanas for release, building the feeding infrastructure, feed concentrate, etc. must be defined, and the source of funds must be identified.

The level of investment at the campesino level will be relatively high. If we assume that the price of a 7-months iguana is USD 2.50, and a recommended density of 600 iguanas per hectare, the campesinos' investment only in animals will be about USD 1,500 per hectare. This amount is relatively high compared to traditional campesino crops. Consequently, financing the start of an iguana operation will be a problem for most campesinos.

The project authorities envisage that the Center will charge USD 1.00 for 7-months iguanas from the campesinos, and that the remaining production costs (USD 1.50) will be recovered from the iguana commercialization (processing, marketing, etc.). This assumption appears to be based on an unrealistic vision of total control over the production, processing and marketing operation. It is assumed that more than 200,000 7-months old iguanas will be released (i.e. sold to campesinos) annually after 6 years of project implementation.

Finally, the production models for the campesino's part of the production cycle have not yet been validated. What we assumed to be an implementation of the iguana production at village and campesino level, in Llano Grande de Ocu, Panamá, is not yet at this stage. The Llano Grande campesinos are in fact working for the project, assisting in the research activities. The Project releases certain numbers of iguanas in the campesinos' backyard, and provides free concentrate to feed the animals. The campesinos are not allowed to harvest animals except on very special occasions. The major part of the production in the campesinos' backyards is used for production of eggs for the hatchery. Thus, no data are available from Llano Grande regarding the economy of the production at the village and campesino level.

Several experiences made by the campesinos in Llano Grande indicate that the iguana production will not function according to the model envisaged by the Project, once the campesinos gain control over their own production. In the farm backyards, the campesinos usually have fruit trees. The harvest of fruits are clearly reduced by high densities of iguanas, as the iguanas eat the flowers and fruits of both citrus, tamarindo and mango. In addition, wild birds and animals eat the iguana feed concentrate. Consequently, the campesinos says that if they owned the iguanas they would try to use less concentrate for iguana feeding. Additional feeding will to a large extent be based on surplus plant material from vegetable production, from the household, etc. It was also stated by campesinos that they will aim at running the whole production cycle themselves, including incubation and hatching.

As a result, all economic figures analysed above are rough estimates. A thorough analysis should be possible of the actual production costs at the Centers in Costa Rica and Panamá, to establish the actual price of 7-months iguanas for release. There is, however, an urgent need to implement the production model at the campesino level, to gain experience regarding how the idea will work economically and socially. It is, however, unrealistic to expect that the Project will be able to maintain control over the production and trade in iguanas by campesinos.

4.5 TRAINING AND TRANSFER OF TECHNOLOGY

Up to present the investments by NORAD in the Project has not benefitted the local farmers to any significant degree. There has been no transfer of iguana management technology to farmers, but some transfer of the central philosophy of the Project, as well as some training in forestry and artesany. Given a favourable economic and market analysis, the basis has, however, been established to transfer the technology of iguana production to farmers and villages.

The selection of project beneficiaries (campesinos, parcel holders, and other poor rural groups) appear relevant. Some efforts have been made to initiate the implementation of an iguana management model in a few rural communities, one in Panamá and five in Costa Rica. The farmers who have been involved in Panamá, however, have mainly acted as project staff, and not as independent farmers utilizing a new source of income.

4.5.1 In Panamá

In Llano Grande, Panamá, about 30,000 to 40,000 iguanas have been released by the Fundación, partly in the "patios" (backyards) of 11 farmers who are organized as iguana breeders (Annex, Table 13). In the beginning, 16 farmers took part in this activity. The farmers' operation in Llano Grande may be seen as the first step in an implementation of iguana management at the village level. However, at present this operation is still a part of the research activities of the project. The farmers are not allowed to harvest anything but a very few animals, notably in connection with the local "Iguana Festival" where iguana dishes are served.

The project has also involved four schools and other community groups in the area. This appears to have had a positive community mobilization effect. However, it is now important to move a step further. The farmers did express an expectation that their involvement in the activity should, in the near future, enable them to make some economic benefit from selling iguanas. To fulfill this expectation, and at the same time move one step ahead in the practical implementation at village level, the individual farmers should be provided with a harvest plan, telling how many adult animals they may harvest annually.

The production of juveniles at the center in Llano Grande should be kept up by a system where the farmers supply gravid females to the center, and receive juveniles for release on their property. This operation should be based on realistic economic calculations, to ensure that the system is economically sustainable. It should be noted that some of the farmers in Llano Grande considered themselves capable of running the whole production cycle including incubation and breeding of juveniles. Supply of juveniles to other farmers were believed to be a possible market.

The planned iguana restaurant in Chitré may serve as a first outlet for the production of iguanas in Llano Grande, but the operation should be based on realistic economic figures. Any subsidizing of this operation may inevitably lead to grave disappointment when the source of subsidies are no longer available.

Concerning the reforestation efforts by FPIV, it appears that in Llano Grande there is a tendency to plant non-native trees, especially Teca and Gmelina. Pochote (*Bombacopsis* sp.), which is a deciduous native species, was also planted to some extent. At least 20-25 % of any reforested area should be planted with native tree species which acts as food for the iguana.

4.5.2 In Costa Rica

Up to present, the iguana management model has not been introduced as a part of the village production system in Costa Rica. There have been transfer of the central philosophy of the Project, and the activities of the project have had a positive community mobilization effect, possibly linked with the small donations (fertilizer, seeds, barb wire for fences and a rice peeling machine) that 67 parcel holders received from the Government of Canada through FPIV as intermediary (Annex, Table 14).

There is close relationship and collaboration with the Ministry of Education, Ministry of Labor and the Institute of Agrarian Development (IDA). This collaboration have benefitted several groups, such as different producers, three women groups, and students and teachers of four schools in the area. It is remarkable that there is no formal collaboration with government authorities responsible for natural resources (Ministry of Natural Resources, Energy and Mines, or Ministry of Agriculture). Neither are non-governmental organisations in this field involved in the Project activities, and there appear to be no collaboration with other iguana or other wildlife management projects in the region.

From four different local schools, 144 students and five teachers have received a small environmental education

program about the relationship between man and nature and a related tour in the Iguana Center and Reserve. Three women groups, including 43 women, are being trained in handcraft based on natural materials. The instructor is paid by FPIV (Annex, Table 15).

More directly related to the management of the iguana reserve and the future implementation of the iguana management model, 30 local parcel holders and 19 members of the Coopebarro cooperative have received training in fire prevention techniques from a MIRENEM specialist and nursery techniques from the foresters of FPIV. In contrast to Panamá, the reforestation activities in Turrubares were mainly based on planting native trees. However, there was a lack of seeds, which could delay the establishment of the plantules needed to plant at the right time on the field. The beneficiaries in Turrubares were aware of the importance of the conservation actions in order to protect their land, the forest and its wildlife.

Based on discussions with the Project's extensionists and foresters, and comments of the producers in Panamá as well as in Costa Rica, it could be inferred that the Project has no established methodology for its work with the local people. In the training and extension activities it is important to avoid putting the Project in a paternalistic position. There is presently a tendency towards a situation where the people will become dependent on the Project for everything. The Project will supply the juvenile iguanas, make every decision in management of iguanas, and provide donations of agriculture and iguana production inputs.

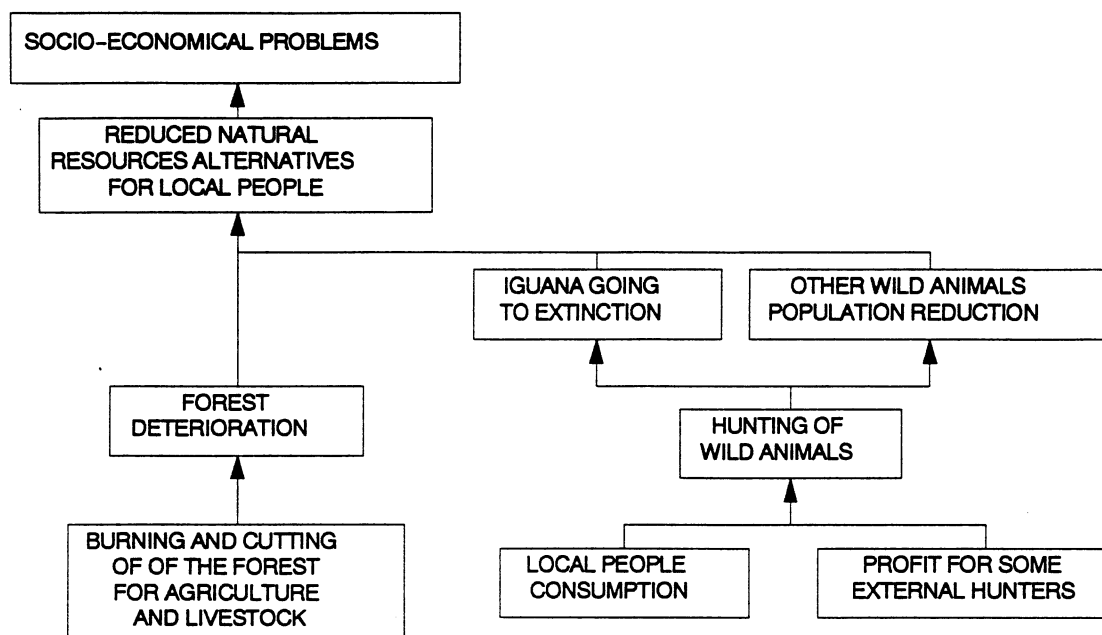
The training and extension methodology is linked to the strategy of the Project. If the strategy is participatory, the concept and the techniques has to be transferred to the people in order to enable them to make the decisions. Then it will be up to the producer (as the owner of the production system) to decide in matters like the size of the forest area where iguanas should be released, the number of iguana to be released each year, the species of tree used for forest restoration, the amount of feed concentrate that will be used, etc.

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Figure 1. Models of the specific problem (A) and project concept (B).

A. The problem



B. Demonstrative model of sustainable management of iguana

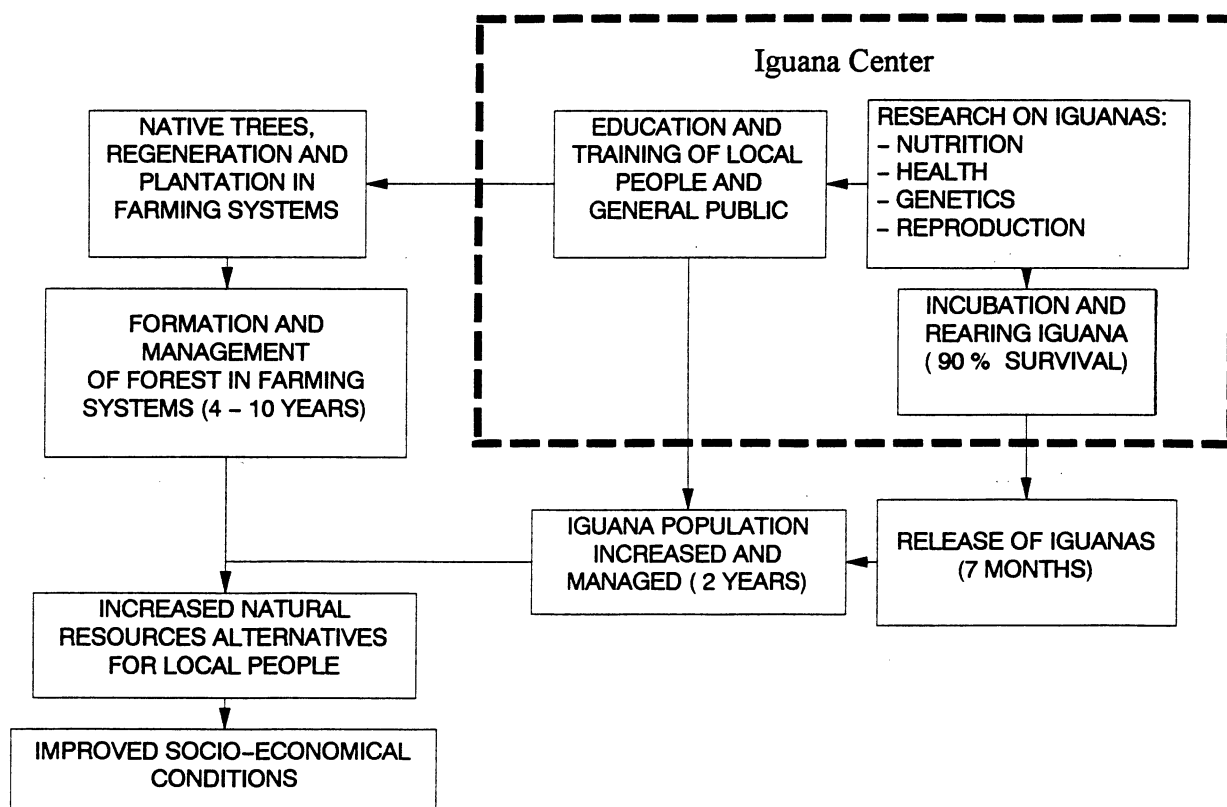


Figure 2. Iguana Verde Project: the first crop flow.

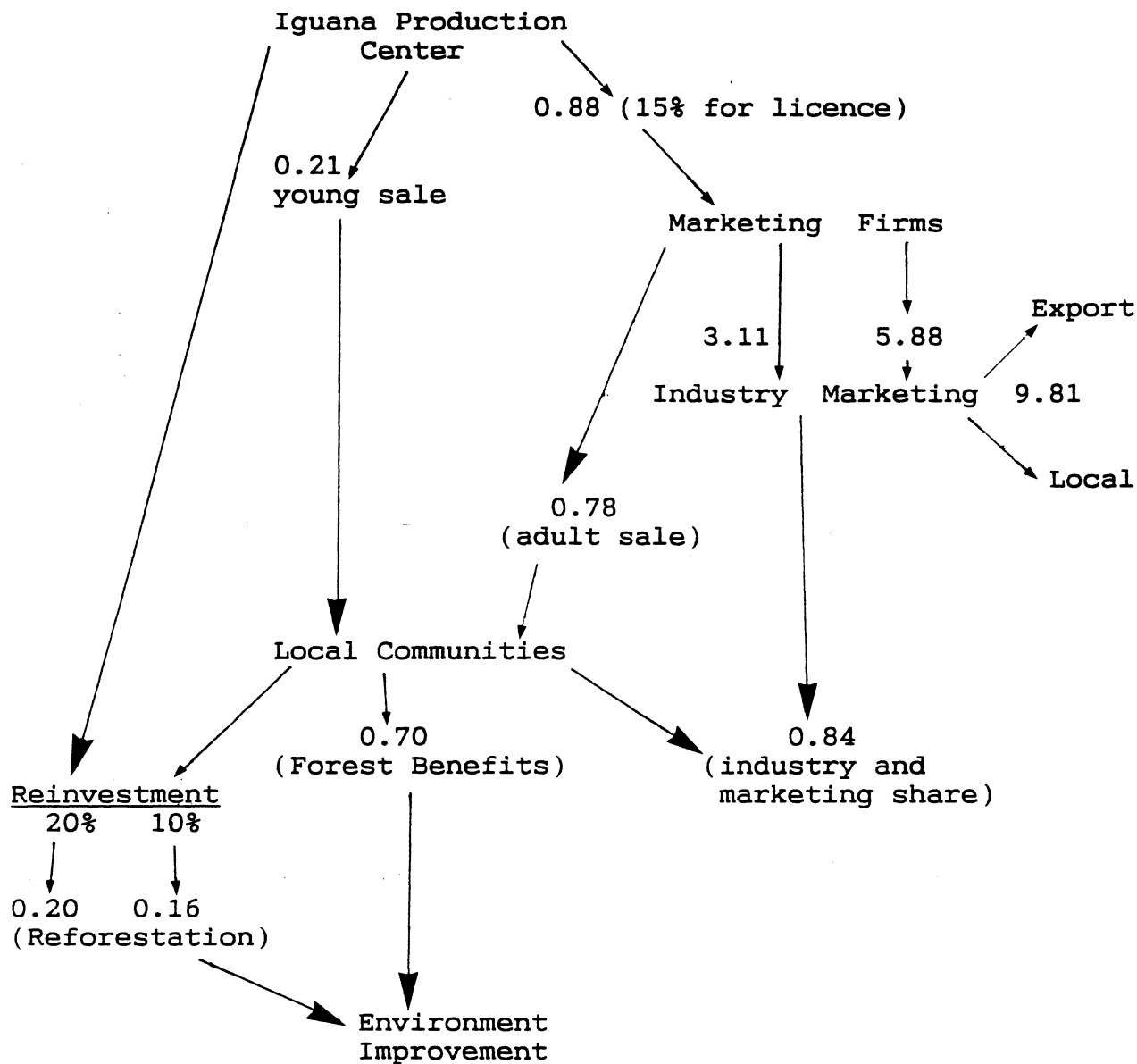


Table 1. Terms of Reference for Project Review of CAM 023, Iguana Management Project.

Annex to agreed minutes
from annual meeting CAM 023
dated 18.11.92

TERMS OF REFERENCE

for a project review of

CAM 023 - IGUANA MANAGEMENT PROJECT

1. BACKGROUND

An agreement regarding support to the Asociacion Pro Iguana Verde (APIV) with a financial frame of NOK 1,5 mill was signed in July 1991. An addendum to the agreement with a financial frame of NOK 18,5 mill for activities to be carried out in the period 1992 -95 was signed in San Jose in October 1991.

The objective of the project is to obtain sustainable utilization of natural resources by including management of tropical forests and wildlife, with emphasis on green iguanas, into general farming systems.

In the Annual Meeting for the project held in Managua 18th November 1991 it was agreed that a review of the project should be carried out in 1993. A separate review of the legal aspects of sale and export of iguana products was agreed to be carried out in late 1992. This review is partly being done by the project itself and it was decided to include these issues in the main review to be carried out in 1993.

2. OBJECTIVES

The objectives of the review is to assess the strategy of the project and to analyse the progress of the project to date and its possible problems, in order to make recommendations for possible adjustments in the work plans of the project.

3. SCOPE OF WORK

The review shall comprise discussions, assessments and recommendations concerning the following topics:

- 3.1 The objectives of the project and the approach being used.
- 3.2 The criteria used for the selection of project beneficiaries.

- 3.3 The administration of the project and its appropriateness with respect to project sustainability.
- 3.4 The research and development programme with respect to achieving the objectives of the project.
- 3.5 The methodology and mechanisms chosen for the transfer of technology to farmers.
- 3.6 The costs of the project in relation to the results for the beneficiaries, considering both the environmental and social effects of the project.
- 3.7 The possibilities of the project, or parts of the project, to become economically sustainable, with and/or without government (donor) support.
- 3.8 The aspects of sale and export of iguana products, using the projects' own research as a starting point.
- 3.9 The extension of the project to Nicaragua and to other countries in Central America.
- 3.10 The project's relations to national institutions and its cooperation and coordination with other similar projects.
- 3.11 The equipment proposed by the project for its veterinary laboratory.
- 3.12 The proposed training of the projects veterinarian
- 3.13 The quality of monitoring and backstopping to the project.
- 3.14 Any other topic which the team finds relevant to the project.

4. PARTICIPANTS, MODE OF WORK

- 4.1 The team shall consist of:

Mr. Odd Terje Sandlund, zoologist, Norwegian
Institute for Nature Research, Norway, team leader

Dr. Desiree Elizondo, Private consultant, Managua

.....

- 4.2 The team shall review all relevant documents on the project and have discussions with project personnel, relevant local authorities and officers of NORAD/Managua

and NORAD/Oslo.

3

- 4.3 The team shall visit project sites in Panama and Costa Rica and the NORAD office in Managua. The team shall further visit sites and discuss with the management of other iguana projects not under APIV. The team leader shall visit NORAD/Oslo for discussions prior to the field work.
- 4.4 A preliminary report shall be presented to NORAD/Managua and the project management, in Managua, within two weeks after the start of the field work. A final report, written in English, shall be completed in Managua within the following week and handed over to NORAD/Managua for copying to the project management and NORAD/Oslo.

Managua, 18th November 1992

Arthur Sydnes
Resident Representative, NORAD

Table 2. **Program and people interviewed by the review team, March 1993.**

-
- Wednesday 03/03/93
- Arrival in San José, Costa Rica; 8:00–8:30 P.M.
Odd Terje Sandlund, Head of the Review Team, from Norway to Costa Rica.
Ariel Cajina and Alain Meyrat from Nicaragua to Costa Rica.
- Thursday 04/03/93
- Meeting with Dagmar Werner, Ramón Esquivel, Daisy Rey, Eileen Flores and Roberto Vides. General introduction to the Iguana Project by D.Werner and R. Vides at the San José Office.
 - Travel to the Research and Training Center at Laguna, El Barro, Turrubares.
 - Meeting with Randal Ruíz, Extensionist.
- Friday 05/03/93
- Meeting with part of the personnel of the Center:
 - 6 of 8 people who work with iguanas,
 - 3 of 5 constructors,
 - 2 of 5 Iguana Reserve Area Guards,
 - 2 of 4 of the Fire Prevention Team,
 - 1 cook.
 - Meeting in San Pablo with Alvaro Vindas, Regional Director and Rafael Blanco Manager of the Agrarian Development Institute (IDA) and Juan Céspedes Rodríguez, President of the Parcel Holders of Turrubares.
 - Participating in San Pablo at a ceremony of handing out certificates of land tenancy (for housing and production parcels) from IDA to the parcel holders of San Pedro, San Pablo, Bijagual and Paso Agres; 5,630 Ha for 2,360 beneficiary families.
 - Visit to the nursery of cooperative COPEBARRO's farm (574 Ha: 37 Ha with mango plantation; 12 Ha of papaya plantation; 428 cattle heads and 100 Ha of forest); meeting and talking with Rafael Rojas, Secretary; Alvaro Nuñez, Educational Committee; and 8 of the 23 members about nursery, plantation, and fire protection training.
 - Meeting with the parcel holders: Víctor Campos, Gerardo Campos, Emilio Campos, Carlos D'Santi and Leticia Molinas in the parcel of Carlos Córdoba. C.Córdobas is the vicepresident of the Parcel Holders, president of the Bean Producers and Representant of the community at the Ministry of Labor. He has a parcel of 8 Ha, a nursery with gravity irrigation, he plants rice and corn for autoconsumption and he manages 20 beehives, producing 30–40 gallon of honey in 1993.
 - Visit the communal rice mill "Dra Dagmar I. Werner" which was donated by the Government of Canada, inaugurated 14/02/93. The rice mill functions together with a scale obtained by the farmers' own initiative.
 - Visit and talk with three producer from Asentamiento (Housing) "Marcos Perez": Braulio Areas Méndez, Ramón Madrigal Mora and Ramon Campos Trejos. They dedicate their land (12–14 Ha/farmer) to grain (rice, corn and bean) for consumption and about 2 Ha for perennial crops mostly mango.
 - Meeting with Artesany Women Group of Paso Agres (20 members), lead by Gisel Chaves Flores. They were ending a training course in handcraft offered by the Project with a woman trainer from Orotina.
- Saturday 06/03/93
- Conversation with Ramón Esquivel, Veterinary of the Project about the preventive, curative and monitoring system needed to avoid epidemics in the captive population of iguanas.
 - Conversation with Dr. Enrique Pérez, Veterinary, Economical Advisor of the Project about topics related to the economical feasibility of the Project.
 - Presentation of the VAMPP program and M (MUMPS) language by Dr. Enrique Capella. VAMPP will be adapted for iguana research and production data.
 - In the evening, horse riding throughout the Iguana Reserve (400 Ha).

- Sunday 07/03/93
 - Conversation with Lic. Alner Palacios, Lawyer, about the legal aspects related to the management and use of wildlife and natural resources in Costa Rica.
 - Conversation with Mr. Oscar Ruiz, Forester of the Project in Costa Rica, about technical aspects.
 - Monday 08/03/93
 - Attending an introduction/demonstration of CRIPAS (Dr. M. Baayen) and VAMPP (E. Pérez, E. Capello and J. Buurman) at the Veterinary School, Universidad Nacional, Costa Rica. Information about ACRENPAAC (Natural Resources Management of the Pacific Central Region, Costa Rica) by Dr. Edward Müller.
 - Meeting at FPIV with Jannicke Bain, Tove Stube, O.T. Sandlund, D. Werner, A. Cajina and A. Meyrat informing the NORAD representatives the progress of the Review Team's mission.
 - Conversation with Viviane Solis, wildlife specialist of IUCN/ORCA in relation to the Iguana Project.
 - Conversation with Dr. Federico Holmann, economist, in relation to the economical feasibility of the Iguana Project.
 - Meeting of J.Bain, T.Stub, O.T. Sandlund, A. Cajina and A. Meyrat about administrative matters.
 - Tuesday 09/03/93
 - Travel to Panamá City and Llano Grande de Océ.
 - Conversation with Ariel Urriola, Aldo Córdoba and Ervis Guevara, foresters and two iguana research assistants of the Project in Panamá.
 - Conversation with José de la Cruz Avila, father of an iguana breeder.
 - Conversation with Samuel Ibarra, President of the Iguana Breeders of Llano Grande de Océ.
 - Wednesday 10/03/93
 - Visit the creek area where studies are performed on the repopulation of iguanas (owner Guillermo Mitre).
 - Visit the patio of Luis Carrasco, a breeder with many iguanas.
 - Visit Sixto Pinto ("Castillo"), who is doing reforestation along the river, preparing the conditions to release iguanas.
 - Visit the patio of Cesar Quintero, another iguana breeder.
 - Thursday 11/03/93
 - Travel to Panamá City and back to San José.
 - Friday 12/03/93
 - Writing the Draft of the Evaluation Mission Report.
 - Saturday 13/03/93
 - Departure from Costa Rica.
-

Table 3. Iguana Verde Project personnel, 1993.

Position	Name	Comments
IN COSTA RICA:		
PROFESSIONAL PROJECT STAFF:		
Project Director	Dagmar Werner	Part Time paid by NORAD funds
Project Officer	Daisy Rey	
Public Relations Off.	Vacant	Ms. Deborah Meadows to be named
Envir. Educator	Vacant	
Biologist	Roberto Vides	
Veterinarian	Ramón Esquivel	Part Time
Economist	Vacant	Federico Holmann to be named
Economist	Enrique Pérez	½ Time.
Nutritionist	Fernando Calderón	Part Time
System Analysis	Enrique Capella	½ Time
MUMPS Programmer	Jan Buurman	Part Time
Data Manager	Walter Amador	
Marketing Expert	Vacant	Michael Ferris to be named.
Accountant	Eduardo Rodríguez	3/4 Time.
Secretary	Eileen Flores	
Lawyer	Mario Recavado	½ Time.
Lawyer	Jorge Cabrera	
Forester	Oscar Ruíz	
Extensionist	Randal Ruiz	

WORKERS:

- 8 Helpers in iguana rearing.
- 5 Constructors.
- 5 Iguana Reserve Guards.
- 4 Fire Prevention Rangers.
- 4 Carara Park Guards.
- 1 cook at Iguana Center.
- 1 Janitor in San José Office.

IN PANAMA:

PROFESSIONALS:

Lawyer	Alvaro Dengo	¼ Time.
Lawyer	Luis Shirley	¼ Time.
Accountant	Tilcia Dimares	
Forester	Ariel Urriola	
Extensionist	Aldo Córdoba	

WORKERS:

- 3 Helpers in iguana rearing.

TOTAL PROFESSIONAL POSITIONS= 24; (Vacancy= 4; Named= 20: Full Time= 7; Part Time= 4; 3/4 Time= 1; ½ Time= 3; ¼ Time= 2).

TOTAL FIELD WORKER POSITIONS= 31

TOTAL PERSONNEL= 51, VACANCY = 4

Table 4. Accomplishment of planned activities during 1991 and 1992.

Activities	progress
1. The activities considered to be implemented for the economic feasibility are:	
1991:	
Define model analysis procedure for local sales (country by country, Mexico to Panama)	none
Define model analysis procedures for international sales	none
Consult data bank for international value of iguana products and products from similar species (reptiles)	low
Execute analysis in two Latin American countries for local marketing (Costa Rica, Panama)	low
Advise on fees to be paid to FPIV by rural and commercial producers	none
1992:	
Complete economic feasibility study for international market	none
Execute analysis of economic feasibility on local market for Central America and Mexico	none
Advise on feasibility of implementation in Central American countries for local and export market	none
Advise on sales prices, locally	none
Advise on sale prices, internationally	none
Define export quota regulation	none
Advise on feasibility on international market development activities	low
2. The activities considered to be implemented for the development of market controls are:	
1991:	
Establish rules under which iguana management technologies will be made available to: A. rural communities; B. commercial enterprises (licensing system). Prepare document that will be signed by parties involved, principally FPIV and implementation site	none
Improve tagging system to distinguish between animals produced in management operations and wild caught specimens for sale in local markets	none
Develop control mechanisms to prevent illegal sale (locally)	good

Initiate development of control mechanisms for international trade good

Assess functionality of control and tagging system proposed by
FPIV and put into practice by the National Institute of
Renewable Natural Resource in Panama (new legislation) good

Utilize this system to modify and improve rules for other
countries in the region low

Determine whether or not the technology should be patented to
protect objectives of program; initiate patenting procedures
(if advisable) good

Initiate research for international trade control systems low

1992:

Implement alternative tagging system (if necessary and
available) to that practiced in Panama none

Improve control models for international trade none

Continue patenting procedure low

Consult with regional governments to change legislation for
trade of managed iguanas (and other animals) low

Explore (and define) methods to prevent success of
"pirate operations" low

3. The activities considered to be implemented for market development are:

No activities were considered, except assess feasibility of
market development. low

Table 5. Iguana Verde production costs (USD/ha/year)

Concepts	1	Year 2	3	TOTAL
Iguana aquired	600			600
Feeding + Infrastructure	450	450		900
Cropping			50	50
Transport			25	25
TOTAL	1,050	450	75	1,575

Table 6. Iguana Verde production model and gross income (USD/ha/year)

Concepts	USD
Gross Income (500 units x \$ 4.00)	2,000.00
Income created from leather processing + marketing (10% from processing + from marketing)	2,250.00
Income created from meat processing + marketing (10% from processing + from marketing)	160.00
TOTAL GROSS INCOME	4,410.00

Table 7. Iguana Verde net income model (USD/ha/year)

Concept	USD
Gross income	4,410.00
Production costs	1,575.00
Income before interests	2,675.00
Financial cost (22% anually/1 year)	345.00
Net income	2,490.00

Table 8. Iguana Verde gross margin of the leather production (figures in USD).

Margin %	Concept	Margin/ Campesino	Total/ Iguana	Total/ ha
8	Campesino	4.00	4.00	2,000
32	Industry	1.60	16.00	8,000
60	Marketing	3.00	30.00	15,000
100	Consumer	8.60	50.00	25,000

Table 9. Iguana Verde gross margin of the meat production (figures in USD).

Margin %	Concept	Margin/ Campesino	Total/ Iguana	Total/ ha
8	Campesino		0.30	150
32	Industry		1.15	575
60	Marketing		2.16	1,080
100	Consumer		3.60	1,800

Table 10. Iguana Verde total net income for campesinos (USD/Ha/year)

Concept	USD
Total Gross Income	2,000.00
Total Production Costs	1,575.00
Net Income	425.00

Table 11. Iguana Verde net income related to other campesino crops (USD/Ha/year)

Concepts	Net Income
Iguana Verde	425.00
Hot Pepper	520.00
Cassava	1,718.50

Table 12. Iguana Verde production projection in Costa Rica

Year	young released	wild young	adult for sale	income at retail
-1992	12,000	-	-	-
1992	15,000	3,600	-	-
1993	30,000	6,960	6,000	324,000
1994	30,000	5,328	17,808	961,632
1995	30,000	8,547	43,814	2,365,956
1996	30,000	21,030	63,313	3,418,902
1997	30,000	30,390	81,488	4,400,352
1998	30,000	39,114	106,014	5,724,756
1999	30,000	50,887	133,123	7,188,642
2000	30,000	63,899	181,617	9,807,318
2001	30,000	87,176	210,004	11,340,220
2002	30,000	100,802	243,122	13,128,590

Table 13. Participating persons in Iguana Project in Llano Grande (1,700 Ha) of Océ District (1,139 inhabitants; 7,000 Ha), Panama, March, 1993.

NAME	AREA MANAGED (ha)
Iguana Breeders:	
Sixto Pinto	3.0
Heriberto Pérez	3.0
Gerardo Bustavino	3.0
Luis Carrasco	2.0
Guillermo Mitré	2.0
Cesar Quintero	2.0
Herminio Avila	1.5
Samuel Ibarra	1.5
Jose Cruz Avila	1.0
Zunilda Carrasco	0.5
Hector Rodríguez	0.5
11 Breeders	20.0 ha
Participating Schools:	
Cristina R, de Pinzon (Llano Grande de Océ)	
La Polonia	
Llano Hato	
El Calabazal	
Foundation Area:	
Repopulation (Counting) Area	0.8
Dispersion Area	0.8
Liberation Area	2.5
Foundation total	4.1
GRAND TOTAL	24.1 ha

Table 14. Number of persons participating in the Iguana Project in Costa Rica, March 1993 *

VILLAGE	TOTAL POPULATION OF VILLAGE	No PARTICIPANTS BY VILLAGE	POTENTIAL AREA TO MANAGE (ha)	AREAS AVAILABLE** (ha)
FARMERS:				
El Barro	17	5	28.5	
El Llano	12	1	7.0	
Marcos Pérez	11	8	98.0	62
Laguna	26	16	108.0	46
COPEBARRO	19	19	100.0	50
TOTAL	85	49	341.5	
WOMEN PARTICIPATING:				
Paso Agres	52	20	-	Handcraft group
Tárcoles	70	17	-	Handcraft group
Lagunas+Llano	38	20	-	Handcraft group
TOTAL	160	57	-	Handcraft groups
GRAND TOTAL	204⁺	86	341.5[@]	

Note: * 67 parcel holders have been assisted with different agricultural inputs.

** areas available for iguana release in 1993.

+ excluding Laguna+Llano, already included above.

@ the area to be managed is associated with men.

Table 15. Education and training events provided by the Iguana Project in Costa Rica, 1992.

BENEFICIARY	No OF PEOPLE	TOPICS
PRODUCERS:		
COOPEBARRO Cooperative	25	Fire Prevention and Control and Nursery Establishment.
Lagunas Community	16	Fire Prevention and Control and Nursery Establishment.
Marcos Pérez Community	13	Fire Prevention and Control and Nursery Establishment.
WOMEN:		
Lagunas Community	8	Artesany and Handcraft.
Paso Agres Community	20	Artesany and Handcraft.
El Llano Community	15	Artesany and Handcraft.
COMMUNITY SCHOOLS*:		
El Llano School	52 students 2 teachers	The program was similar for all the schools, containing e.g.:
Marco Pérez School	17 students 1 teacher	- Talks about the relationship between man and nature.
Paso Agres School	38 students 1 teacher	- Excursions to the Iguana Center and Iguana Reserve
Lagunas School	37 students 1 teacher	- Drawing contest about the journey learnings.
EXTENSIONIST**:		
MAG (Ministry of Agriculture and Livestock)	Still Unknown	Training the extensionist about the data collecting system for VAMPP.
UNIVERSITY STUDENTS:		
MS students of Wildlife Management Programe, UNA	10 MS Students	Laboratory of Wildlife Management Courses.

Note: * - 75 primary schools from Puriscal are going to include the topic iguana in Natural Sciences courses.
 - The Technical College of San Pablo will include Wild-life Management in the programs of 6 different grades.
 ** - Progress Report, 1992; training to CATIE, MIRENA people.

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