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*NINA•NIKU*  
**PROJECT REPORT**

Evaluation:  
CAM-023 Iguana management:  
a model for rural development

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Hernaldo Santos  
José Carlos Vasquez



NINA•NIKU

Foundation for Nature Research and Cultural Heritage Research

# Evaluation: CAM-023 Iguana management: a model for rural development

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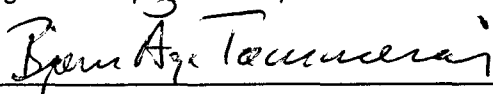
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## Foreword

In a letter dated 15. December, 1995, NORAD requested the Norwegian Institute for Nature Research (NINA), represented by Dr. Odd Terje Sandlund, to lead a team to evaluate the project CAM-023 Iguana Management. The evaluation had been decided on the Annual Meeting between the Asociación pro Iguana Verde (APIV) and NORAD, 14.-15. December, 1994. The terms of reference (ToR) for the evaluation are given in Annex 1. The evaluation team consisted of four experts: Dr. Carlos de la Rosa and M.Sc. José Carlos Vásquez were recruited by APIV, whereas Lic. Hernaldo Santos and Dr. Odd Terje Sandlund were recruited by NORAD.

The field work lasted from 3.-16. January, 1996. The programme of work and the list of people met are given in Annexes 2 and 3, respectively. The final report was presented and discussed at NORAD/Oslo 27 February 1996.

The evaluation team wants to thank APIV staff, the Norwegian Embassies in Nicaragua and Costa Rica, and all involved persons for their assistance during field work. As team leader, I want to thank my collaborators in the evaluation team for good work and a positive and productive attitude to a difficult task.

Trondheim, 28 February 1996

Odd Terje Sandlund  
Team leader

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## Summary

In the summary, the specific points of the ToR (Annex 1) are referred to by relevant key words.

### General aspects

*Efficiency:* The funds appear to have been used in an efficient manner.

*Effectiveness:* The project has achieved its purpose in improving the conservation status of the green iguana. The general status of the species has been improved, at least in Costa Rica, and the technologies for artificial breeding are well developed. The project goal of implementing iguana production at the local rural community level has, however, not been reached. Consequently, the conservation goal related to improved management of secondary, riparian and windbreak forest has not had any significant impact outside the project localities in Panama and Costa Rica.

*Impact:* The project has had a significant impact on the general public opinion concerning the green iguana. Its impact in the local communities where the activities are situated are mainly related to providing employment, and to some extent training and technology transfer to local community groups. The work to reduce wildfires has also been successful. The work towards the additional goal (not included in the original project description) of environmental education has been quite successful in the regions where the project is active. The community development aspect has, however, shown little progress, and the process have been characterized by paternalistic rather than participatory methods.

*Relevance:* The two main objectives of the project: better management of the agro-landscape and rural development, are still very relevant. It has still not been convincingly demonstrated that iguana management can have any significant lasting contribution in this respect. This will depend on factors like, e.g., the economic sustainability of the farmer's part in the operation.

*Sustainability:* The economic sustainability of iguana production, both as a commercial operation by e.g. APIV, and as an additional and alternative form of production by small farmers, has not been demonstrated. The long term sustainability of iguana management without outside funding will totally depend on this factor.

### Special aspects

*Relation to local communities:* It has been possible neither to refute nor verify the various forms of criticism that have been raised against the project. There are, however, several aspects of the project structure, organization and leadership that may provide objective reasons for some of the criticism. During the second half of 1995, several proposals

have been made by the project to improve this situation.

*Coordination with other projects:* Other projects and individuals working in this field complain about lack of collaboration, and a reluctance on the part of APIV to provide information and assistance.

*Relation to public institutions:* This collaboration has been greatly improved since 1993, and APIV now has a good collaboration with all relevant public institutions in the Central Pacific Region of Costa Rica. This also appears to be the case in Panama, and in the relationship to e.g. CITES in the Central-American region.

*Training, publication, transfer of technology etc.:* The environmental education activity (directed towards schools and the general public) has been successful, as has been the general media coverage of the project's activities. The training and extension aimed at local farmers appears to have had less impact, and the farmers do not see the project ideas as theirs. The popularized publications of the project has greatly improved since 1993, but the documentation of technical data from the research and development work is not satisfactory. Several of the figures provided on production technology, production costs, etc. are not backed by generally available data.

*Development of iguana products:* This development has not been finalized, although significant progress has been made. The major problem is for meat the question of the relationship between price and the size of the market, and for leather the problems of production cost, quality of products, and potential market.

*The sustainability at farm and community level:* Neither the economic nor the social sustainability of iguana production at farm and community level has been demonstrated. The project is still in full control of all aspects of the operations.

*Internal feasibility studies:* The conclusions in most feasibility studies performed within the project appears to be overly positive to fit with the predetermined wish of the project leadership. E.g. the market study for meat determines a potential market for iguana meat which seems to be unrealistically large, and the effects of market price level of the meat is not considered.

# 1 Introduction

Improvement of living conditions for the rural populations is an important means to achieve sustainable community development in developing countries. Improved living conditions have to be based on improved resource use, which implies e.g. conservation of soil and water resources. Development of a diversified production which provide incentives to maintain the vegetation cover is one important step in this direction. To be sustainable, these productions has to be profitable in an economic sense, as well as socially and culturally acceptable.

Breeding of the green iguana, *Iguana iguana*, has been envisaged as a feasible activity for small farmers (campesinos). Iguanas have been consumed traditionally in many parts of Central America. Their meat and eggs are excellent sources of protein, and the skins are raw material for leather goods. Properly managed, the green iguana can be a sustainable source of food and income for farmers in poor areas of the isthmus.

The green iguana depends on trees for survival and may be found in high densities in forest edges. It can therefore be successfully produced in small forest plots, windbreak vegetation, and farm patios with sufficient tree cover. Its vegetarian and generalized diet as well as its gentle disposition renders the species an ideal semi-domesticate to be kept in secondary forests. Raising iguanas for local consumption and for profit can be an alternative source of income to farmers, as well as relieve pressure on the natural populations. The iguana raising and maintenance activities also add an alternative value to the forest, which traditionally often has been seen as an impediment to farming. Forest conservation enhances conservation of water and soil resources that are generally lost in poor rural areas due to poor land management.

The project activities to be evaluated in this report concern the development of a feasible system for supply of juveniles to campesinos, involvement of local communities, transfer of technology and know-how regarding handling of released animals, advise on natural resources management related to iguana production, and the various activities related to trade and marketing of iguana products.

The scope of this evaluation is defined in the terms of reference (ToR, see annex 1). The analysis of the performance of the project is particularly based on the objectives stated in: (1) the original project description, (2) the agreed minutes from the special meeting between APIV and NORAD in June, 1993, and (3) the annual work plans for the years 1993-95. Additional information, such as work plans, research reports, publications, newspaper and magazine articles, employee lists and related information, and other



relevant information was provided by APIV. The information presented in this document is the product of the discussions with the APIV personnel, their beneficiaries and the evaluating team, as well as interviews with people outside the project.

A short evaluation has inherent weaknesses. To evaluate a project that encompasses many topical areas in two different countries and to produce a draft document in 12 days mean that some questions will remain un-asked and many areas will be evaluated only superficially. The design of the evaluation, with the APIV preparing the schedules, meetings and most activities meant that some key people, among them some critical to the project, were not interviewed in any comprehensive manner. The oral information obtained, both from personnel within and outside the project, has been evaluated as objectively as possible. The team takes responsibility for the accuracy of the information presented in this document. We do not, however, claim to have uncovered the full picture of the various conflicting views regarding this project.

The logistic aspects of the evaluation were taken care of adequately by APIV, which provided transportation and facilitated access to information, people and facilities in an unrestricted and effective manner.

This evaluation report describes the findings of the team in section 4, whereas the conclusions and recommendations have been compiled in sections 2 and 3, respectively. The findings section more specifically treats the project's accomplishments on the specific topic, and give specific evaluation of the observed methods, results and/or activities findings of the evaluation team on each area of the project.

## 2 Conclusions

### 2.1 General conclusions

The general conclusions of this evaluation may be summarized as follows:

The two major objectives of the Iguana Verde project are (1) conservation of natural resources through the sustainable management of green iguanas, and (2) rural development by implementation of iguana production in local communities to create an alternative source of food and income for poor farmers.

The project has contributed to the first goal by developing the technology for efficient breeding of the green iguana, and raising public awareness about the value of wildlife, exemplified by the green iguana. On a local level, the project's activities in Llano Grande (Panama) and Turrubares (Costa Rica) has contributed to the conservation of forest vegetation.

On the national level in Costa Rica, the official acceptance of the management plan for the green iguana, developed by the Iguana Verde project, is a major contribution towards adoption of the principles of sustainable use of wildlife resources.

The project has had little effect in terms of implementing iguana production as an alternative source of food and income for local farmers. Although there may be many explanations for the lack of concrete results in this major area, one important reason appears to be that the project efforts have been detracted from the tedious activity of technology transfer and training of campesinos. In this area, the development since the previous project review (1993) has been small.

The internal structure of the APIV and the Iguana Verde project appears not to have changed much since the previous project review (1993). The monolithic decision-making and instability of the staff remains. The recent (1995) efforts to improve this situation appears to be too little too late in relation to the five-year NORAD-funded project period.

The Iguana Verde project must be classified as an unusually large environmental project by NORAD standards (3 mill USD over five years). On this background, the results obtained in relation to the major objectives of the project are not impressive. The results are better regarding more immediate objectives (e.g., infrastructure development, environmental education, local conservation efforts) which partly are of marginal significance for the process to reach the major objectives. These immediate objectives, and the planned activities to reach them, have been accepted by NORAD through the annual project meetings.

## 2.2 Specific conclusions

The specific conclusions below relate to the findings described in chapter 4.

### 2.2.1 Project goals

The project's significance as a conservation project to save wildlands and threatened species has been somewhat exaggerated, as its potential importance lies in improved management practices for cultivated lands. It is presently not a "conservation" project in the traditional sense of the word. However, the aims of the project are clearly within the concept of "conservation and sustainable use" as applied in the Convention on Biological Diversity (CBD).

The mixing of different iguana populations in the breeding stock is not in line with good practices for enhancement of wild local populations. Although little is known about the genetic structure of wild iguana populations, we may assume that population-specific breeding is preferable from a conservation standpoint.

The efforts in CITES work funded by the project are presently of little significance for the original project aims, but may be important for developing standardized practices for national and international trade in iguana products in the region.

The project work has to a large extent been concentrated on various immediate objectives defined during the project period, as accepted by NORAD. Although these objectives have partly been positive for the ultimate objectives, this process has detracted from particularly the work regarding rural development.

### 2.2.2 Organization of the project

There is no clear definition of the organizational structure of the project or of the APIV. Most strategic decisions, both of the APIV and of the project, are still in the hands of Dr. D. Werner. To this date, neither the APIV nor the project have an operational organogram. This affects negatively the progress of the project.

The verticality of the decision-making process continues to be a habitual practice that inhibits the formation of interdisciplinary teams, and which weakens the structure of the organization.

Excluding the annual workplans adopted by the annual project meetings, there are no short-term or long-term strategic plans for most or all components of the project. The two main strategic areas of the project, rural development and biodiversity conservation, present serious coordination problems. In practice, the

second strategic area (conservation) have been given priority in the project work.

Neither the project nor APIV have effective instruments for the hiring of personnel. There are also several essential administrative instruments missing (Internal Work Code, vacation plans, employee incentive program, etc.)

### 2.2.3 Technology development

Detailed information, including all technical and scientific data, is not available or has not been presented to the evaluation team, to the donors, or to the scientific community at large. Since many decisions and the future of the project depend on these data, they should be available for peer review. Also, analyzed data are not available in technical reports or in the annual reports presented to NORAD (and they have not been required by NORAD).

The foundation has a tendency to develop its own technologies and to incorporate all aspects of production and processing of products into its structure. The project is developing facilities for the processing of the meat and is also studying the possibility of developing tanning facilities. A detailed analysis of the economic and logistical feasibility of this strategy instead of incorporating the new technologies into existing businesses and plants seems to be lacking.

### 2.2.4 Infrastructure

The infrastructure at Turrubares, in particular the Iguana Park, is only partly or indirectly of relevance to the main objectives of the project. The facilities are well suited for environmental education of both school children and adults. This function was, however, not originally defined as a goal of the project. It may be argued that this function indirectly supports the achievement of the project goals. Development of the facilities has, however, been accepted by NORAD at the annual project meetings.

Transfer of competence and technology to campesinos would probably be better served through targeted extension work based on face-to-face communication with farmers (see chapter 4.5).

The Iguana Park also functions as a tourist facility, and may well be economically feasible as such. This is not, however, in accordance with the goals of the NORAD-funded project. The environmental education part will demand continued support from donor agencies if it is to continue, as the local schools will probably only to a limited extent be able to pay the costs of utilizing the facilities. However, if incomes



from tourism can be used to subsidize environmental education for school children and technology and competence transfer to farmers, the Iguana Park may serve several purposes.

The operation of the release-harvest cycle in the breeding center/iguana reserve complex is to be considered part of the research activity to develop the actual production costs for harvestable iguanas. After 12 years of research it is quite disappointing that this has still not been accomplished. The production of juveniles has only to a very limited degree resulted in release of animals on the properties of local campesinos. The activities of the production center and reserve consequently results mainly in the development of a closed entity with little impact on the local societies in Turrubares or elsewhere except the employment provided by APIV.

### **2.2.5 Training and transfer of technology**

While the project is going into its eighth year in Panama, there still is strong dependence on the FPIV for all aspects of iguana management at the patio and village level. Farmers still do not feel they can have their iguanas and use them or manage them freely. There has been no commercialization of iguana products (meat or skins) and the farmers have not yet seen any economic benefit from keeping the iguanas.

While most families in Llano Grande participate in allowing iguanas in their patios and feeding them with the FPIV-provided concentrated food pellets, there is little other participation by the individual farmer in iguana raising and management.

In Costa Rica, the acquisition of the necessary permits for the operation of the meat plant and the commercialization of the leather projects will take the project to its next and probably last stage: demonstration of the economic sustainability of the iguana management and the incorporation of iguana management in real-life situations.

The project has achieved ample national and international recognition for its novel approach to conservation and its blending of social and economic issues with sound management of lands via conservation of a species. However, the project has not been very successful in establishing a clear role in the communities where it is active.

There is a need for specialized materials and/or activities that target specific user groups with information more relevant to them.

There appears to be sufficient materials available for the naturalists and guides of the Iguana Park, and for biologists and technical personnel of the project.

### **2.2.6 Legal matters**

In Costa Rica, most of the legal obstacles for the harvesting and commercialization of iguana products have been removed, and the first real scale operation may be performed in 1996.

In Panama, this is still not possible, although there is hope that the legal obstacles will be removed during 1996.

### **2.2.7 Inter-institutional and social development**

During 1995 the project have realized and taken advantage of the opportunities to collaborate with the various governmental organizations, especially in area of rural development. This activity has allowed APIV to utilize inherent weaknesses of the local institutions to their own benefit.

In the case of Panama, the interinstitutional relations seem to be more developed with the Ministry of Public Education, with the inconvenience that the activities carried out by the project there are not part of a well developed strategic plan for the schools or for the project, but more simple promotional activities for the project.

The local communities where the Iguana Verde project is situated are not involved in any real sense in the operations of the project. However, many of the local people express a positive attitude to the project as a major provider of jobs and because of their efforts to minimise wildfires and reduce poaching.

### **2.2.8 Economic feasibility**

The costs of production have not been properly recorded. Consequently reliable figures do not exist. Detailed calculations of running costs and fixed costs are not available.

The implementation of the iguana reproduction and the total production process at the local level has been abandoned by APIV, as culturally and economically unfeasible.

The economic incentive for farmers to keep iguanas in their plots appears too low to encourage their interest in the activity to any large extent.

By the present model, campesinos will not be owners of the iguanas but will be renting their land at a low price. During the harvesting process, the campesinos will become employees of the APIV without any participation and control over the production and commercialization processes.

Development of an artisanal industry to produce items from iguana leather is a risky operation due to possible price levels and quality demands.

The added value of the iguana product will be created during the processing of meat and skin and the marketing process. The present picture seems to indicate that in economic terms, iguana production will benefit other sectors of society than the local rural communities (pet-shops, tanning industries, etc.)

APIV or the production and marketing center appears to develop into a profit maximizer enterprise. The MINAE policy is to support the rational use of natural resources, but will not extend any exclusivity to the APIV or impose any limitations to other entrepreneurs interested in producing iguanas. Therefore, if the iguana management activity proves to be profitable, competition must be expected.

### 2.2.9 Special issues

There are presently many forms of criticism raised against the project. We have not been able to verify claims, but have reason to believe that some of the criticism reflects real problems within the project.

Measures taken in 1995 to restructure the project and to implement proper management procedures may improve this situation. These measures are, however, too late to have any influence on the situation evaluated in this report.

The criticism from the local communities discloses a lack of well established social lines and communication which would be preconditions for successful transfer of technology and empowerment.

## 3 Recommendations

### 3.1 General recommendations

The Iguana Verde project, due to its complexity and some of the doubts and questions raised during the 1993 review and the present evaluation, requires a more detailed and deeper review of several critical areas in order to reach more specific conclusions.

The economic aspects of a multi-funded complex project like the Iguana Verde project is very difficult to understand with a superficial review. Consequently, a more in-depth auditing of the different accounts of the APIV-FPIV activities, in collaboration with other donors, may be needed if NORAD wants to have a clearer picture of these matters.

There is an apparent need to professionalize and consolidate several areas of the project, particularly the technology transfer, contact with local communities, environmental education and data management and publication. The project should spend some effort (and resources) in hiring highly competent personnel with proven experience in these areas.

The remaining NORAD-funding should be targeted at completing the production cycle (slaughtering and marketing of products in a realistic scale).

Additional NORAD funding should, if found feasible at all, be restricted to very specific and well defined activities of APIV.

### 3.2 Specific recommendations

The specific recommendations below relate to the findings described in chapter 4.

#### 3.2.1 Project goals

The project PR should reduce its emphasis on nature and species conservation and emphasise its potential as a project for sustainable rural development and conservation of cultivated lands and buffer zones.

The efforts should be concentrated in the area of rural development, which will depend on professional extension workers and constant contact with campesinos and local communities to make them accept the iguana management as their own activity.

### 3.2.2 Project organization

It is particularly important to define clearly the organization limits of the APIV and of the project. Both the project and APIV must have a clear and effective organogram that responds to the needs of the project.

The verticality of the decision-making process is still a problem in the project and APIV. We recommend an ample internal discussion to define clearly the functions and responsibilities of each hired person, within the general framework of the project.

It is necessary to form interdisciplinary teams in charge of their respective work areas. A successful implementation of such teams would allow a better participation of the personnel in the decision-making process. Also, this would leave the project leader with more time to work with strategic planning and the more scientific aspects of the operation.

It is particularly important for the future work to develop immediately short- and long-term strategic plans. These will guide the project as a process, not as the sum of a series of isolated activities.

We recommend the structuring of the operative plans based on consensus of the Board of Directors. These plans should be discussed in detail with the technical professional personnel before their implementation.

At a more structural level, we recommend a real independence between the different directive levels of the APIV and the administrative, managerial, technical and operative levels of the project, as well as an active participation of national technical teams in the monitoring of the activities carried out by the APIV.

### 3.2.3 Technology development

Detailed data should be made available to NORAD in the form of technical reports, where the results of the past and ongoing investigations should be presented in a clear and organized form. Any analyses and projections should be substantiated by data.

NORAD should give more attention to the organization of the information that is generated by the project by e.g. requesting the inclusion of data in a technical section in the annual reports.

The large scale processing of meat and skins should be analyzed for its economic and environmental costs. Emphasis should be put into the incorporation of any new technologies for meat and skin processing into existing facilities or businesses, rather than creating new facilities within the foundation.

The problems of accessing technical data indicate a need of a proper technical audit of the data of the technology development.

### 3.2.4 Infrastructure

The economy of the education activities directed at schools and the general public needs to be analyzed to investigate the economic sustainability of these activities when no donor funding is available. The economic feasibility of a combination model at Iguana Park, including tourists, schools and campesinos should be investigated.

### 3.2.5 Training and transfer of technology

If iguana farming is going to benefit the individual rural families, farmers must be allowed to have their iguanas in their patios and manage them at will, having been provided with a clear guidelines.

For this purpose, formalization of the "iguana technological package" as e.g. a Manual for the Iguana Farmer, should be developed. This would clearly describe all practical elements of iguana farming and utilization (see Annex 4 for suggested contents).

The remaining NORAD funding should be concentrated towards completing the final stage of the production cycle, i.e. slaughtering and real scale commercialization of iguana products.

This demonstration of realistic possibilities must be performed before entering an altogether new venture (the Salinas II project). An expansion of the project at this moment might dilute efforts in an organization already stressed by few key personnel.

The project needs to refine the methods and the type of information that reaches the communities, focusing its efforts in specific interest groups or "users". These groups need specialized materials and treatments which need to be developed to reinforce the direct-contact activities of the project. Among the user groups that need specific information adapted to their level are: children, school teachers, government officials and administrators, farmers and land owners (in their different levels of participation).

### 3.2.6 Legal matters

Efforts should be concentrated to Costa Rica and Panama to develop legislation and systems which enables commercialization of iguana products.

Regarding commercialization of meat and skins in Panama, the project should request the support of the local authorities to expedite the process to remove legal obstacles.

### 3.2.7 Inter-institutional and social development

Inter-institutional relationships should be periodically evaluated by the APIV, in order to consider new factors and situations and take adequate corrective actions.

The collaboration with local chapters of public institutions should facilitate a closer monitoring and constructive discussion of the activities of both the institutions and the project.

Given the characteristics of the Public Education Ministries in Costa Rica and in Panama and their interest in cooperation, it is necessary to develop the process through the formulation of collaborative work plans. The possibility of reaching the students directly and continuously through the incorporation of environmental themes and materials into the official curricula is a great opportunity. The joint formulation of strategies and the incorporation of the FPIV/APIV in the process opens the possibility of influencing environmental education at the national level.

To achieve success in the community development aspect, it is necessary to conceptually and operationally redefine the participation of the communities in the project. The communities should be the owners of the project, not only because of the stated objectives of the project, but also because of the source of the funds and the non-profit character of APIV. The role of APIV should be as a facilitator of development processes. Although the project has carried out participative diagnoses during the last year, it is time to begin actions geared towards resolving the problems identified by these diagnoses.

It is necessary to give real attention and support to the rural development sector of the project, strengthening the social promotion and environmental education components and activities within local communities.

It is recommended not to extend the project activities beyond the present localities in Costa Rica (Turubares/Orotina) and Panama (Llano Grande).

Before the APIV extends its activities to other areas, all present activities should be consolidated and realized. Of particular importance are the social organization of the communities, the effective participation of the communities in the project, and the generation

of employment and income, stemming from ordinary (not experimental) operations.

To incorporate Salinas II to the present project would weaken the activities that are barely beginning in the immediate area of influence. APIV could, however, negotiate with IDA the acquisition of the offered land. This land may later be used as planned if in the future the projections for iguana production and its economic sustainability are realized.

The immediate neighbors of the Iguana Park should have freer access to the installations. The identification of the communities with the project depends partly upon their possibilities to enjoy and utilize the facilities within their community.

### 3.2.8 Economic feasibility

A revision and correct calculation of the production costs of 7-months old iguanas is of vital importance to evaluate the economical sustainability of the iguana production.

Real-scale production at the village level must be implemented as soon as possible to obtain real figures regarding the profitability of the iguana management concept.

Campesinos should be given the opportunity to act independent of the project, rather than as employees of the APIV. They should have the decision power to determine what to do with the harvested iguanas.

The scheme of reproduction and commercialization at the APIV represents a monopolistic form of production and trade based on law enforcement to control poaching and illegal trade. Instead of centralizing the whole process, more control should be given to local farmers. Otherwise the presence of the APIV will be indispensable and the farmers completely dependent on the success or failure of the economic and marketing strategy applied by the APIV.

A method to census iguana populations in large areas (e.g. Iguana Reserve, 362.5 ha) should be developed in order to facilitate prediction of harvest numbers.

The models presented in 1994 by D. Saenz and J. Quiroz were directed to the *finqueros* (medium and large landowners) as the economic agents to become the producers of iguana meat and leather. This analysis is outdated in relation to the new model presented by APIV, which neither considers the transfer of the reproduction technology to the private sector of the country nor to anyone who is not within the scope of the APIV. Therefore these studies have to be corrected and updated.

It is unrealistic to expect small farmers to invest in additional feeding concentrate to increase the carrying capacity in their plots. It is known that some other wild animals also feed on the feeding stations. Thus, the calculations of the possible additional income should be based on the natural carrying capacity of the area chosen for release of animals.

The project now has the capacity to start commercialization of the iguana meat and leather. It should be done at relatively small, but realistic scale to test the efficiency at the production center and acceptance in the market of the iguana products.

### 3.2.9 Special issues

NORAD may, if possible in collaboration with other donors, perform a close independent audit into the most serious criticism against the project.

## 4 Findings

### 4.1 Project goals

The original project document "Iguana management: a model for rural development", presented to NORAD in 1991 stated the ultimate objective of the project as "to apply a model for rural development which has immediate benefits for the conservation of living resources at the village level". The means to achieve this was to re-establish green iguana populations in rural areas to produce high quality protein, as well as income for campesinos from the sale of iguana and tree products. The implementation of the project was to be performed through five project components, i.e. training, advisory extension services, development of technologies, village demonstration projects, and trade controls and marketing. Additional proximate objectives to reach the goals of the project have been defined in annual work plans and in the minutes from annual meetings between APIV and NORAD.

Thus, the two major goals are rural development and conservation. The conservation concept underlying this is somewhat elaborated in the original project document, addressing two problems. First, the agricultural practices of small scale farming in the tropics causes deforestation and soil erosion. The practice is therefore unsustainable, leading to a deteriorating quality of life for the rural population. Second, the green iguana has been considered a threatened species listed by CITES. This renders international trade with green iguana products illegal. The central idea of the Iguana Verde project is consequently to encourage campesinos to maintain forest vegetation on their land through the management and harvesting of green iguanas. This would make agricultural practices more sustainable, and simultaneously stem the trend of declining iguana populations.

It is important to point out that the project is not dealing with conservation of wildlands in national parks, nature reserves etc. It deals only with conservation in the sense of sustainable management of areas outside conservation areas. This is clearly at odds with much of the publicity given from the project, where "saving the rain forest" and other slogans of nature conservancy are frequent. The newly produced information pamphlet for Iguana Park also uses "saving the tropical forest" as a slogan. The relation between the project aims and nature conservation lies in the possible improvement of quality of buffer zones and areas bordering on conservation areas.

The status of the green iguana when the project activities were started (1983-1991) would probably warrant some conservation action, although the actual population levels and area of occurrence at that time is

not well documented. The best conservation measure would in all cases be to increase suitable habitat areas and to decrease pressures (from hunting etc) on wild populations. Any captive breeding programme for threatened animals must take the genetic structure of the species into consideration. In most cases, mixing of animals from distant populations should be avoided, as this in the majority of documented cases is detrimental to the fitness and local adaptations of the offspring. The import of iguanas from Panama performed by the project to start breeding in Costa Rica is not in accordance with principles of conservation breeding. It could possibly be accepted in the case of a species on the absolute brink of extinction, which has not been the case with the green iguana. The significant project resources spent on work in CITES may also be questioned in relation to the conservation aim. This effort may, however, be relevant in relation to restrictions on trade with iguana products.

The rural development part of the project would need to emphasize training and technology transfer to local communities and individual campesinos. Enabling new ideas and techniques to gain foothold in local rural communities is a difficult process, which needs to be given professional and labour intensive attention. To have a sustained effect in the communities, the transfer of technology and know-how must occur through a participatory process.

The Iguana Verde project has defined a series of additional more or less immediate goals through the five year project period. These objectives have been described in the annual work plans and accepted by NORAD at the annual project meetings. Among the major additional objectives are:

- 1 Development of legal frameworks in Panama, Costa Rica and regionally to facilitate regulated trade in wildlife products, specifically green iguana products.
- 2 Development of an environmental management plan for the specific area in and around the Iguana Reserve in Turrubares, Costa Rica.
- 3 Construction of extensive infrastructure for environmental education and tourism in connection with the iguana breeding center.
- 4 Change public attitude towards the green iguana.
- 5 Perform reforestation programs in areas where green iguanas could be released.

Some activity regarding these immediate objectives may be considered necessary to reach the ultimate objectives of the Iguana Verde project. However, the activities of the project personnel appear have been channelled towards these activities to such an extent that it has detracted from and diminished the efforts aimed at the major objectives. This relates in particular to the rural development aspects.

## 4.2 Organization of the project

The organizations of the Iguana Verde project and the APIV are characterized by some common problems. There is no clear distinction between the project and the APIV, to such extent that even some of the higher ranking officers have problems distinguishing their organizational limits. These problems may originally stem from the establishment of APIV, which was demanded by NORAD at the beginning of the project.

There is a formal organizational scheme for APIV and the Iguana Verde project. However, many of the high ranking members of the organization (the Board of Directors of APIV) are also high ranking employees with strong influence in the execution of the project. This situation has been consolidated over the years. Meetings with present employees of the APIV as well as with friends of the organization and ex-employees indicate that most strategic decisions of the APIV as well as of the project are dictated by the project leader. This critique has been repeated many times in the past, e.g. by IUCN in 1989 and by the previous NORAD evaluation in 1993. We conclude that, in the case of future NORAD support for this project, the situation has to change completely, based on the conventional administrative principle that the more vertical a project structure is, the weaker is its organizational structure. The main consequence of the vertical structure of the project is that team work and interdisciplinary coordination of activities are not well developed.

### 4.2.1 General administrative issues

There is no clear and effective organogram for the project and for the organization. This adds to the problem caused by a lack of long-term workplans. The annual workplans are not sufficient in this respect. This has a negative effect on the progress of the various project components and activities. The impression given by most project employees is "here we do what Dr. Werner tells us to do". In spite of the existence of technicians and professionals with a positive interest in the project, the unnecessary verticality of the administration results in an absence of technical teams responsible for their fields of work. Within the project we detected two types of self-criticism. First, the verticalism in the decision making process is contrary to the consolidation of technical and professional teams. This renders them vulnerable to outside critics or influences. Second, as the project has been growing, the verticalism and concentration of power has been increasing, in spite of the multiple objectives and components of the project.



Ideally, this situation should have been resolved after the 1993 evaluation. At that time, the diversification of activities planned for the short term implied a necessary decentralization of the project, i.e. a democratization in the decision-making process.

In other matters, the two strategic areas of the project, i.e. rural development and biodiversity conservation, have received different treatments. The first strategic area has been somewhat relegated, in spite of the recognition in several documents that "the campesino is the principal actor in the execution of the project". The second strategic area is led by a competent and idealistic employee (Dr. R. Vides). He is, however, acting mainly as an occasional consultant, not as a permanent resident member of the project staff.

#### 4.2.2 Instability of the labour force

Through conversations with present and former staff of the project, the evaluation team realized that the instability of labour force within the project stems mainly from the following immediate reasons:

- better salaries outside of the project or institution,
- ending of temporary or occasional activities,
- perceived mistreatment of employees that have committed errors,
- dissatisfaction with treatment given by the managerial or directive personnel.

While the first two causes are common and fully acceptable, it is important to focus on the two last causes. In addition to common personality conflicts between the staff and Dr. Werner in particular, the employment characteristics and idiosyncrasy of Costa Rican employees have contributed to the appearance of particular social and phycho-laboral conflicts within the project. Many of the technical, professional and field personnel of the project express fear of Dr. Werner. The situation is more of a typical "boss-laborer" relationship than an intra-institutional professional collaboration, which is to be expected in a project like the Iguana Verde project and a non-profit organization such as APIV.

Among the underlying reasons for this labor instability may be (a) that there is a lack of effective criteria for selection of personnel, and (b) that there is no Internal Work Code (Reglamento Interno de Trabajo) properly registered in the Labor and Social Security Ministry (Ministerio de Trabajo y Seguridad Social).

To this date, there is no manual for the process of hiring personnel. This not only affects the stability and technical quality of the personnel, but seriously weakens the institution itself. The lack of an Internal Work Code puts the employees in an obvious disadvantage, since they have no clear idea of their

obligations and rights with the institution, particularly during conflicts. The legal instrument commonly used in the project is "direct hiring", which, however, is not applied to all employees. This means that most employees are simply hired and incorporated in the payroll. There are no personnel files for each of them, no terms of reference given to the employees (although there are documents describing the positions and functions), no vacation plans or other standard benefits. Also, the Association (APIV) hires the personnel, while the Foundation (FPIV) has the documents describing all these positions and functions. This is strictly a legal problem that should be resolved within the organization, and result from a proper definition of the roles of each of these institutions.

Parallel to this, it appears that the high labor mobility is tied to the absence of Operative Plans. The absence of these essential documents (especially in a project that involves baseline research, applied research, and rural development with immediate impact on small producers) causes technical and conceptual distortions in the personnel. This weakens their ability to carry out the activities and tasks directed to the achievement of the stated goals of the project.

### 4.3 Technology development

#### 4.3.1 Biology and ecology of *Iguana iguana*

The objective of the technology development component in the original project had to do mainly with incubation and hatching of eggs, nutritional requirements (which will determine the reforestation schemes for farmers as well as the needs to supplement their diet through feeding of concentrates to improve productivity and carrying capacity), captive breeding, optimum ages for release, behavior, disease prevention and control (where the information gathered on diseases, prevention and cure will be made available to the farmers), and the development of a data base on the different environmental situations and experiments on feeding, releases, harvests, etc. Research showed that animals below 7 months of age have high mortality rates in nature, which prompted the development of technology to produce animals of this age for release into the farm plots and secondary forest areas around farms. This was successfully achieved in the first phases of the Iguana Verde project.

Over the eight years of the project in Panama and the five years in Costa Rica, an enormous volume of information has been collected on the biology of the green iguana, in the wild and in captivity. There are

several experiments that have been going on for months to years, including carrying capacity of different forest patches, movements and home ranges, effects on size and movements of iguanas of additional feeding, effects of different harvest schedules, predator control, and perhaps more. The great majority of these data are unpublished and were not available for review. The volume of data is said to be extremely large but there has been little or no formal presentation of them in report form or in publications. Many of the management decisions that are made depend on the availability of sound and reliable data, but these data do not seem to be available in an organized format.

While the project has made an effort to share information at various levels through talks, seminars, workshops and participation in national and international meetings, it is the organization and publication of the data and its wide diffusion that will allow the necessary peer review and criticisms that characterizes the advance of science in general. Even though NORAD is not funding scientific research and publications per se, much of the future of the project depends on a solid scientific base. This base can only be consolidated through the publication and open discussion of the information gathered so far, perhaps in technical reports. The organization and presentation of the data should be extended to all aspects of the project, including the breeding and raising of young in captivity, the results of the different strategies for maintaining released iguana populations (with and without feeding, patio iguanas, "hands-off" iguanas, etc.), and the feasibility of the full production cycle, including harvests.

#### 4.3.2 Meat production

Slaughter technology has not yet been developed. While advances have been made in Costa Rica, there is a lot to be done before the process can be optimized. Aspects such as processing times of carcasses, health protocols, disposal and management of wastes, packaging and distribution, have not been fully worked out yet. All of these elements are critical for the proper evaluation of the economic feasibility of this part of the project.

#### 4.3.3 Tanning technology and its environmental impact

While there are several commercial tanneries in Costa Rica and in Panama, including the laboratories at the University of Costa Rica, there is no clear plan for the tanning of the thousands of skins that will be produced by the harvests. This is a similar case as for the processing of the meat. Also, as in the case of the

meat, the project is thinking to develop its own tannery. Tanning technology is traditionally very polluting, using harsh chemicals that are environmentally damaging. No studies have been made so far on alternatives to the conventional methods of tanning.

### 4.4 Infrastructure

The objectives of the infrastructure development have been to facilitate the production of young iguanas for release, and to perform instruction of campesinos and environmental education of school children and the general public.

The facilities operated by APIV at Turrubares presently includes the 362.5 ha iguana reserve, the iguana breeding and research center, and the Iguana Park. The iguana breeding center has now been developed to contain incubation facilities with a capacity of up to 180,000 iguana eggs, cages for 80,000 juveniles (< 7 months), and 3,000 adults (breeding population). Over the five years since the establishment at this locality, approx. 100,000 iguanas have been released in the iguana reserve. The plan is to harvest 15,000 animals in 1996. In Llano Grande, Panama, there are incubating facilities for 25,000 iguana eggs, and cages for 12,000 juveniles and 150 adults.

At the breeding center in Turrubares, facilities for slaughtering iguanas have been built. There are plans to build a oxidation pond for treating organic waste from the slaughtering. The cost of this is estimated at USD 7,000. Without this waste treatment facility, the slaughtering facilities can not function, and its operational status is required by official regulations.

The Iguana Park consists of exhibition cages for iguanas, a lecture room for up to 40 people, cafeteria and kitchen facilities, and a curio shop. It is neatly designed and is used in the environmental education activities and in serving tourists. The total investments will amount to approximately USD 170 000, funded by NORAD, GEO and Japan.

The reserve has been developed with forest trails for information and education. Water supply has been installed and "rondas" (firebreaks) have been cut to facilitate prevention and reduction of forest fires. This has been very successful, as the frequency of wildfires has been reduced to approximately zero. The design and marketing of Iguana Park indicates that tourists (Costa Rican and foreign) will be the main target group.

## 4.5 Training and transfer of technology

The objective of the training and transfer of technology component of the iguana project is "to transfer the basic understanding of the management model and the technologies to those that will be implementing the village demonstration projects" (Project paper, 1991). Thus, this component envisions training activities at a center (in Costa Rica) and specific training activities in the field, at the implementation sites.

Several models of the technical aspects of iguana management in the communities appear to have been implemented or being in the process of implementation. In Panama, villagers of Llano Grande maintain iguanas in their patios, and provide additional feeding for them (feed is provided by the project to the farmers). They participate in the monitoring of the population in their farms, as well as in harvest activities regulated by the project staff. Also, there is the breeding center managed entirely by project staff. In Costa Rica, there is a large breeding center, managed and operated by the project, as well as controlled releases in individual farms, repopulation of the iguana reserve, and organization of groups of farmers as collectors or harvesters, which will carry out, under project supervision, the harvest of the iguanas for the multiple purposes (meat production, leather production, and crafts articles). Participation of farmers varies from minimum-involvement farmers that "lease" their forest for the maintenance of iguanas but participate little or nothing in the other activities, to farmers that work as collectors and farmers that involve themselves in the production of meat, leather and/or crafts.

Due to legal stumbling blocks in both countries as well as time factors (iguanas need 2-3 years of growth from the moment of release to harvest time), the actual commercialization of the iguana products (meat and leather) has not been attained. Market analyses and studies, as well as some training and practice in food production and craft production, appear to have been performed, especially in Costa Rica. However, no "real life" experience in mass production and marketing of products has been conducted yet.

### 4.5.1 Panama

Many aspects identified in the 1993 NORAD evaluation were confirmed and re-identified in this evaluation. In Panama, the same groups of people involved in the project in 1993 were still doing very much the same in 1995-96. Interviews with the farmers that kept iguanas in their patios reveals a general acceptance of having the animals there, a general negation of their direct use of them ("we do not kill and eat them unless the FPIV tells us when

and how many"), and a dependence on the project to provide extra food, data collection (counts), harvest, processing and young iguanas for release. The project also organizes reforestation activities with the farmers and school children (a mixture of exotic species like gmelina and teak and a few native species, such as pochote, although the choice of species does not seem to follow any particular reason), and encourages control of illegal hunting by the farmers themselves. Other activities include fire prevention and control, the iguana festival, school meals, and other educational activities (see below).

The relationship between FPIV and the farmers is friendly and collaborative, although perhaps a little paternalistic. It is assumed that there is some surreptitious consumption of iguanas by the farmers, which is all right with the project. All farmers are "allowed" to harvest and consume certain number of iguanas per year (around 20) although there is no clear policy of how this is done and controlled. Iguanas harvested by the farmers for personal consumption should be reported to FPIV who keeps tabs on utilized iguanas. Panamanian legislation still makes the hunting of iguanas without this control illegal.

All breeding and hatching of the iguanas is done at the FPIV, who maintains a captive population and a hatchery. Farmers bring, with FPIV support, gravid females to the project and get them back after egg laying is done. All incubation is done at the project's facilities, as well as the raising of the hatchlings until they reach release age (around 7 months). Young iguanas to be released are branded and released in specific farms and patios. Very few iguanas are kept as pets by children of the farmers.

Local farmers appear to have accepted and to appreciate the presence of the iguanas in their patios and lots. They feel good about the publicity and about the project, and feel they have benefitted in general terms by the FPIV activities in their town ("the foundation put Llano Grande in the map" was a typical comment). Participation in the iguana project is mostly restricted to Llano Grande (30 to 35 families) and a few more in neighboring Llano Hato.

There is an organized group of iguana harvesters that work closely monitored and assisted by the FPIV personnel and INRENARE representatives when harvest times comes. Harvest of released iguanas is practically confined to the iguana festival activities (once a year) and to the school meal program (about once a month).

## 4.5.2 Costa Rica

In Costa Rica the progress in the transfer of technology to neighboring farmers has been somewhat faster, and on a larger scale. There have been numerous workshops and lectures given to farmers and neighbors of the project, especially in Turrubares and surrounding villages. A detailed socioeconomic study has been carried out that attempts to identify areas where project actions should be concentrated. Fire prevention and control, reforestation and vigilance against poachers are activities promoted by the project and generally accepted by the communities.

In Costa Rica, there are several APIV/FPIV activities in addition to those funded by NORAD that are carried out in the project area and that affect or complement the iguana project activities. At the Costa Rican locality, the participation of neighbors and farmers also varies from little involvement to direct and continuous involvement in project activities. We were informed that there also are several "hands-off" examples, where iguanas have been released in small farms and where the farmers receive little or no additional support from the foundation. However, there are no available results or data from these examples.

There are plans to extend project activities to Salinas II, where the local communities are envisaged to take care of the whole production cycle.

In Costa Rica, bureaucratic obstacles also seem to have delayed the implementation of several critical components of the projects, particularly the commercialization of the skins and leather craft products and the processing and sale of the meat in the open market. This key element of the project will be the "fire-test" and proof of the market analysis and projections made by the studies performed so far.

## 4.5.3 Environmental education

The environmental education activities performed by the project aims at all levels: children, teachers, farmers, communities, politicians and administrators. It also includes a extensive public relations effort through the press and other mass media. The wide effort of environmental education uses the green iguana and its conservation as a focal point, and reaches Panama and Costa Rica, and to some extent also the rest of Latin America. The series of booklets produced (9 booklets so far) is an important part of this activity. Many workshops have been implemented in both countries, and the number of people that have come in contact with the project is very large. The project has also received ample coverage by the media, with more than two dozen articles written in newspapers, magazines and books, TV reports, an

educational video, and participation in public activities and events. The visibility of the project is very high and its appeal is well recognized at the national and international level.

However, the environmental education and extension effort seems to have been concentrated in activities that require intense direction and control from the project. This translates into very few spontaneous activities developing from the recipients of information. In Panama, for example, teachers have received the booklets, have visited the iguana station, seen the videos, heard the talks and seen, touched and even eaten the iguanas. However, these teachers are at a loss when asked what activities they carry out on their own that have to do with iguanas, forest conservation or any of the other elements of the project's philosophy that are been transmitted to the population. The situation applies also to other sectors of the community. People have the feeling that the project is good and that the iguanas are been saved by the project (although some question or didn't know the iguanas were endangered at all), but the main reasons people say the project is good are: because it is a source of employment; because it has put the towns "on the map"; because it attracts tourists; because it provides food to children in the schools; and because it helps save the iguana. Even close neighbors of the project are not completely clear of the project's objectives.

## 4.6 Legislation

### 4.6.1 Costa Rica

Wildlife is considered state property in Costa Rica. Therefore, any use of the resource, regardless of whether it is produced in captivity or caught in the wild, require the authorization from the Ministry of Environment and Energy (MINAE). MINAE requires, among other things, a management plan for the species, the presence of a supervising biologist (the producer has to cover the expenses related to this supervisor), a permit to capture the breeding stock from the wild, permission to release the iguanas, studies of carrying capacity of the area where the iguanas are to be released, and harvest permits. The slaughtering installation requires a permit to initiate the activity, which has to be obtained from the Ministry of Health.

For the tanning of the iguana skins a permit from the MINAE is required. The commercialization of the iguanas started in 1995, when some 1800 young lizards were sold to a pet-shop. For this activity an agreement between MINAE and APIV was signed in 1995, and an Executive Decree from the Presidency of the Republic and the Ministry of Environment was

also emitted in 1995.

APIV and MINAE worked together on a Harvesting Resolution, which controls and limits the amount of iguanas to be harvested from the project areas. APIV provides MINAE with the data used to determine the number of animals authorized to be harvested. MINAE supports the concept of rational use of natural resources, but will not concede any exclusivity to any association, organization or private producer.

A permit (the so-called Scientific Harvesting Card) is given by MINAE to each harvester. Thirteen cards have already been distributed, and thirty campesinos have expressed interest in becoming licensed harvesters.

## 4.6.2 Panama

In Panama the process of acquiring the necessary permits has taken longer than in Costa Rica. The hunting and trade of the iguanas and its products is there forbidden by law. The APIV lawyer, Dr. Alner Palacios, considers that all the legal requirements have been presented to the Panamanian authorities and he expects to get the authorization to harvest and commercialize iguana products in the course of 1996.

## 4.7 Inter-institutional and social development

### 4.7.1 Institutional collaboration

In the present context, the inter-institutional cooperation of APIV is determined by at least four historical factors which are partly inter-dependent :

- (a) The political restructuring of the State adopted by the Costa Rican Government since 1994, in which Government institutions in charge of rural development and agricultural activities have been substantially reduced in staff and financial resources.
- (b) The need to develop and implement rural development and environmental conservation programs and projects in a geographical area that has been seriously affected in its environmental and socio-economic setting.
- (c) The presence in the area of a non-government organization (APIV) that not only has technical and financial resources, but that is carrying out projects that are compatible with the goals and objectives of these government institutions.

- (d) The emergence of new conceptual frameworks and perspectives in public institutions on the role of local communities in the strategic rural development and the protection and conservation of natural resources, and the realization of the fact that the NGOs may be good facilitators of these processes.

APIV has been able to capitalize on this situation, by assuming the role as a catalyzer to make the relevant governmental organizations work together. The net result has been the strengthening of all the organizations and institutions (including the APIV). The creation of the Interinstitutional Executive Commission is not only a product of these efforts, but a very important step in the strengthening of key areas of the project. In this commission, APIV should assume a role as one organization among equals. It should be emphasized that APIV should not try to fill the institutional vacuum that exists in the area. The idea of bringing support to the public and communal organizations should be restricted to those actions that help achieve the goals of the project, not to substitute the public responsibilities of the Costa Rican government institutions.

Inter-institutional cooperation, while strategic for the objectives of the project, should be viewed and appraised by the APIV in two main ways: (a) APIV should recognize that there have been historical contradictions between the objectives and methods of the Agrarian Development Institute (IDA), the Ministry of the Environment and Energy (MINAE), the Ministry of Agriculture (MAG) and the Ministry of Education (MEP), and that these differences have affected the sustainable development of rural communities. (b) APIV must be aware that the alliances with these organizations should be restricted to activities which enhance the objectives of the project.

The participation of the Ministry of Education (MEP) in the project activities and in conservation in general deserves a special mention. The leading local administrators of MEP in the area have expressed their willingness to increase participation in key areas of the project, particularly in those that coincide with the MEP general objectives. Moreover, the Puriscal Canton has been chosen as a Pilot Area for the development and implementation of "school guides" which are later to be applied country-wide. The supervisor for the canton suggested the possibility of using the natural resources and the environment as the core topic in the development of these guides and of other curricular materials. The project should take advantage of this offer and provide the wealth of materials and experiences at its disposal into the "school guides" pilot program.

## 4.7.2 Social and community development

As viewed by the rural communities in Costa Rica, the main achievements of the project have been:

- the generation of employment in the project,
- the control of forest and wild fires, and
- support for change of attitudes in local communities towards the recuperation of the forest and water resources.

In spite of the communities being incorporated in the project plans, their participation and the project's effects on their development have so far been minimal. With the exception of several participative communal analysis, a housing project that benefitted poor families of the area (with the voluntary participation of APIV) and some informal vocational training courses for women, project actions designed to achieve a truly sustainable development for the people and their communities have been few and weak.

In spite of this, the neighbors recognize positive effects of the project, stressing that it has contributed to the organization of a messy and divided community, and established some order among poachers who were not used to adhering to laws before the arrival of the project.

It is important to recognize that rural development is an internal participatory social process, in which the communities take active roles in their own development, rather than being passive recipients. One of the main weaknesses of the project is that it was born as a good-will action of a group outside the community. This has affected every activity of the project, and consequently the communities do not feel as part of the project. The prevailing feeling among the communities is that the project belongs to "people from the outside".

In this context, it is interesting to hear friendly neighbors of the project say things like "it is important to have a clearer and more open communication with the communities on the part of the foundation"; "we need more promotion of the project so the communities get involved"; and "even though I live less than a kilometer from the project, I don't even know what is inside there".

## 4.8 Economic feasibility

The estimates below are based on figures made available to the evaluation team by APIV.

## 4.8.1 The iguana production process

The general steps of the production process may be illustrated as in **figure 1**.

Three different models for organization of the production process has been envisaged:

- 1 the campesinos are responsible for the whole process,
- 2 an association of campesinos operates the whole process,
- 3 APIV takes care of the reproduction and commercialization of the iguana products (pets, meat, eggs and leather), and organizes campesinos to perform the other tasks.

At present the first model may not be feasible, due to both the economic limitations of the campesinos, and the difficulties in transferring the reproduction technology to small farmers with a low level of education. The economic constraints are real, although there should have been ample time during the project period to test this model at local community level. The ability of farmers to develop their competence would have to be tried in practice. It is felt by the evaluation team that with the correct methods and adequate motivation, farmers would be able to adopt the technology relating to iguana reproduction. This may be a larger problem with marketing and commercialization of iguana products.

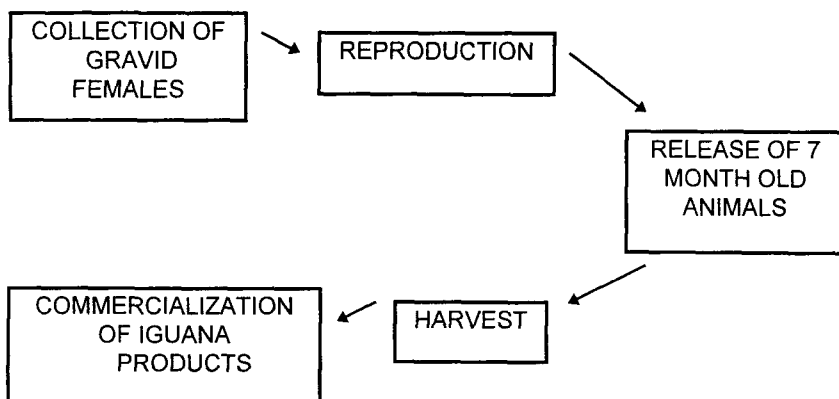
The second model, where an association of iguana producers were to take responsibility faces similar constraints as the first model. In addition, there may also be a lack of organizational experience in the community.

With the emphasis of the original project document very much on rural development, it is quite surprising that practically no implementation of the technology and production process has been tested at the local community level.

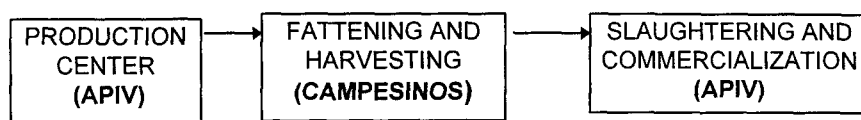
For the production process, APIV proposes the the third model, which may be dubbed a commercial company trade model. APIV would according to this model control the whole production cycle. The role of campesinos is restricted to renting their land to iguana raising and taking part in the harvest of iguanas (**Figure 2**). Farmers will not be active independent economic actors in the process, but rather employees of APIV. APIV will select both the group of harvesters and the campesinos who own land and would allow the release of iguanas on their properties. The slaughtering, skinning, packaging, storage, transport and distribution of iguanas and iguana products will be done by APIV.

Specifically, some of the implications of this model are that:





**Figure 1.** The major steps of the iguana production process.



**Figure 2.** The role of APIV and campesinos in the production process.

- The reproduction of the iguanas will be exclusively in the hands of the APIV.
- All the expenses will be covered by the APIV. No costs other than the opportunity cost of land will be transferred to the campesinos.
- The campesinos will provide their backyards or plots of land with forest patches.
- The harvesting can either be done by the individual farmer or by a group of harvesters sent by APIV.
- The farmers will be paid the USD 0.25 per animal harvested on their property. According to our information, the carrying capacity without feeding concentrate is 100 iguanas per hectare. The animals will spend 2.5 years in the forest before being harvested. The total income per animal for a harvester will amount to USD 2.25 (to the harvester USD 0.25 per animal; for the meat (approx. 1.2 kg) USD 0.50; for the leather USD 1.50). It will be optional for the farmers/harvesters whether to sell the meat or to consume it.
- A campesino producer who chooses to harvest the animals himself, and sells the meat, will have an income of USD 2.50 per animal. Assuming a constant density of animals at 100 individuals per hectare, the maximum gross income per hectare amounts to USD 250 every 2.5 years, giving an annual gross income of USD 100 (assuming 100 % survival rate of animals after release). A study commissioned by APIV assumes a loss of 16.7 % of the iguanas after their release into forest patches (Estudios de Modelos de O y D 1994), reducing annual gross income to approx. USD 85 per hectare. It is assumed by APIV that this level of income will be a sufficient incentive for the campesinos (or land owners in general) to keep and protect animals in their properties.
- A major practical problem for the campesinos may be to keep the animals within their own forest plot, as this will be unfenced. This could become a source of conflict between the farmers. Poaching may also reduce the harvestable stock.
- At the iguana production center (Iguana Reserve) in Turrubares, the number of iguanas to be harvested in the coming years are as follows: 1996: 15,000; 1997: 30,000; 2000: 60,000. A large part of the expected testing of real scale slaughtering production and marketing rests on these numbers. The estimates of the iguana population at the reserve are based on the number of animals released, and may be modified by factors such as poaching and diseases. It is difficult and expensive to census iguanas in the wild, and a reliable figure of survival and possible yield is consequently available only after harvesting.

## 4.8.2 Production costs

The cost of a 7-months old iguana is at present given as USD 2.20. However, the variable costs at the breeding center are not well documented. The specific costs of feeding concentrate, labour force and transport of the concentrate has not been accurately recorded. Medicines have not been included in the variable costs.

The feeding component at the production center calculated for the hatchlings and juveniles until they reach 7 months of age is assumed to be 0.8 g daily, whereas for an adult the amount of feeding concentrate is 20 g per day. This seems to underestimate the feeding costs of juveniles. According to this figure the feeding component will represent less than 12 % of the costs of the reproduction and production of 7-months old iguanas, when excluding the fixed costs, e.g. administration, veterinary service, office equipment, etc.

At present, the total fixed costs at the production center is USD 28,975 annually. The APIV envisages the need to expand the personnel and to build some new offices in order to move the central office to the production center. In connections with the commercialization of the iguanas a slaughtering installation is being built at the center in Turrubares (iguana reserve). A warehouse to storage the products and freezers will be needed. A waste treatment dam has to be constructed. The APIV is assuming that the fixed costs of the fully operative production center will double, i.e. USD 58,000 annually.

## 4.8.3 Costs of production and processing of iguana products (meat and leather)

The estimated cost at the various production stages are as follows (per animal):

Juvenile (7-months old)	USD	2.20
Harvested animal	USD	2.50
Slaughtering	USD	1.50
Tanning of skin	USD	5.00
Transport	USD	1.00
Sum	USD	12.20

Adding 40 % administration costs gives a production cost of USD 17.10 per animal.

The costs for packaging the meat have not been calculated.

The retail price estimated for the iguana leather and meat is, according to the APIV-commissioned study (Estudios de Modelos de O y D 1994):

Tanned skin :	USD	15.00
Meat:	USD	3.00
Sum	USD	18.00

(The price of raw skins is given as USD 5.00).

These figures seems to indicate that the gross income would just barely cover the production costs (total income - total costs: USD 18 - USD 17.08 = USD 0.92. Allocation 1/6 of the production costs (USD 17.10) to meat and 5/6 to tanned skin, the production costs for the two products are USD 2.85 for the meat and USD 14.15 for the tanned skin.

## 4.8.4 Marketing

### Handicrafts and other items from iguana leather

In Puriscal a group of women are being trained with the support of the APIV on the production of different items from iguana leather, such as wallets, key rings, etc. According to the information given, one skin on average gives two wallets and two key rings. The labour costs for producing these items will be USD 10.00. Based on this, the total costs for producing two wallets and two key rings are: (USD 14.15 + USD 10.00) + 40 % administration = USD 33.80. This means that the retail price for each wallet will be over USD 20.00. The market segment able to pay this price will be tourists.

Artisanal products from iguana leather are traditionally produced in Nicaragua. They are sold at public markets. Their quality is not good, but the prices are low, as the iguana skin is treated as waste.

In the case of Puriscal, the crucial question in addition to production costs will be whether they will be able to maintain the necessary quality level during a large scale production. There is also a need to determine the sources of funding for the project in Puriscal, as investments are needed in sewing machines, infrastructure, etc.

There are some problems relating to the economic and marketing studies:

- The costs of research and production at the iguana center have not been separated. Consequently, no reliable data are available to determine the production costs, an essential tool to define the marketing strategy.

- It has been concluded that the present market for iguana meat is 23 % of the costarican population. A consumption of two iguanas per month per household is assumed. This represents a consumption of 9 millions of units a year at price of \$ 3.50 USD each. These results are based on two main questions in the market survey: 1) Have you ever tried iguana meat? 2) If yes, would you buy it again? The conclusions drawn regarding potential markets based on this are not reliable.
- The marketing strategy advised by the consultants is to attack the upper class segment. It is believed that the imitation effect will attract consumers from lower strata. We lack information on how many people belong to the upper class in Costa Rica, and an evaluation of how long will it take before the imitation effect leads the rest of the consumers to ask for iguana meat.

### Pets

The APIV is selling young iguanas at a price of USD 12.75 to one shop exclusively. The retail price at the petshop, "Dr. Echandi" is USD 20.40. The APIV considers the pet market as a tool to revert the general disgust for the appearance of the iguana. Combined with media presentations and information aimed at children, this appears to have been successful.

## 4.9 Special issues

The ToR asks for special consideration of the criticism raised in newspapers and elsewhere. There are three sources of criticism:

- 1 Internal criticism, from former employees of the project
- 2 Criticism from the local community
- 3 Criticisms other development and conservation projects or institutions

The most serious internal criticism concerns the treatment of labourers and staff. The instability of APIV staff even before the most recent problems surfaced seems to indicate that this is no new problem. From the present list of employees, it appears that the majority (62 %) have been with the institution less than 1.5 years. As discussed in chapter 4.2, the internal procedures for decision-making and labour relations needs to be reformed. When this theme was raised by the evaluation team, every single piece of criticism was aggressively countered by the project leadership, and the problems ended up as claims and counter-claims. It has not been possible for this evaluation team to judge the substance in the criticism. However, the number of internal labour problems, and the existence at Iguana Park of a "black-list" of former employees who are under no circumstances to be

given access to the premises indicates the seriousness of this problem.

The external criticism from the local community around APIV installations in Turrubares is most recently voiced in a letter to authorities and donors, signed by 57 persons. This concerns several aspects. When Turrubares was chosen as the project locality in Costa Rica, expectations in the local community were obviously very high. The project was considered a sort of all-powerful landlord who was expected to repair roads and bridges, build schools and churches, and to take care of other social infrastructures. These expectations were clearly unrealistic, and criticism stemming from disappointment in this respect carries little weight. A more serious criticism from the local communities concerns the lack of effort or ability to really involve the communities (see chapter 4.7) and to establish human relations, as exemplified by the question "Why doesn't the Doctora visit us in our homes?" Farmers sympathetic to the project stressed that many people in the local communities were afraid of Dr. Werner. This is a major problem in relation to transfer of technology and empowerment of local communities in the operations developed within the project.

Some of the criticism recently reported in the press was voiced by the owner of the local restaurant ("pulperia"). When the evaluation team met with him, it became clear that some of the reason for his frustration stems from the fact that he feels that he should be given the opportunity to profit directly from the presence of the project. He wanted to sell iguana dishes from his restaurant and felt that the project should have supplied him with meat. This reflects another lack of social sensitivity on the part of the project regarding how to establish realistic and good relationship with all groups in the local community. However, several members of the community expressed their disappointment with the owner of the pulperia, who was claimed to be a poacher.

The criticism coming from other projects and institutions working with conservation and development is partly a professional discussion about ways and means in this work. This should be regarded as part of the normal development process for ideas and methods. Another aspect warrants, however, more concern. This regards the reluctance of the project to freely distribute information. Several sources claim that it is difficult to obtain information and help in a field where the Iguana Verde project have competence.

Serious criticism on major issues as well as minor and less relevant criticism from disgruntled ex-employees or misinformed persons should be addressed by the project leadership with tact and

professionalism. All critics should be responded appropriately and in a serious fashion, never personalized or in derogatory ways. Responses of this kind, which have occurred, are clearly counter-productive.

## **Annex 1: Terms of Reference**

### **Review of cam-023 iguana management, with special emphasis on the sustainability of the project**

#### **1 BACKGROUND**

The Norwegian Agency for Development Cooperation (NORAD) and the Asociación Pro Iguana Verde (APIV) signed a contract on June 26, 1991 about support to the Project *CAM-023 Iguana management. A model for rural development* for the year 1991, and the same parties signed an addendum to the above mentioned agreement on October 3, 1991, concerning aid to the Project for the years 1991-1995 (1996). The two agreements together have a financial frame of 20 NOK (3 million US\$), of which about 17 millions have been disbursed.

Basis for the Project and the NORAD support is stated in the Project document "Iguana management. A model for rural development", September 1990, for the years 1991-1995. The goal of the Project is to foment rural development and nature conservation through iguana management. The Project was reviewed in March 1993.

The present review was agreed upon in the Annual Meeting between the two parties held in Costa Rica 14 and 15 December, 1994.

#### **2 OBJECTIVE**

The main objective of the review is to assess to what degree the objectives of the Project, as stated in the original Project Document, have been reached.

Regarding the above, it should also be evaluated whether *de facto* new objectives have been developed in the course of the Project. It should be assessed whether these are relevant and desirable, with reference to the intentions of the original objectives of the Project, and whether they have been reached.

A further purpose of the review is to obtain input to an assessment of whether to extend NORAD support to a subsequent phase of the Project, and if so, what changes in the Project profile are recommended.

#### **3 SCOPE OF WORK**

During the study, special emphasis should be laid on the development of the Project after the evaluation performed in 1993. The review shall comprise

discussions, assessments and recommendations on the following general and special aspects of the Project:

#### General aspects:

- efficiency, i.e. assess how economically the inputs have been converted into outputs
- effectiveness, i.e. measure the extent to which the Project has succeeded in achieving its purpose
- impact, i.e. assess the positive and negative changes produced, direct or indirect, by the Project
- relevance, i.e. assess the degree to which the objectives of the programme are or remain pertinent, significant and desirable
- sustainability, i.e. the extent to which the partner institution, other institutions or local people will continue to pursue the purpose and goal if the external assistance is terminated (e.g. institutional and economic/financial sustainability)
- any other subject the team may find relevant

#### Special aspects to be considered:

- the relation to the surrounding local society, with special reference to criticism raised in some newspapers and letters. The evaluation of this aspect should give both parties (APIV and representatives of the critics of the Project) the possibility to express their views in separate meetings with the team.
- the co-ordination and cooperation with other similar Projects
- the relation to public institutions
- the training, extension and publication activities of the Project
- the transfer of technology to farmers and local communities
- the development of iguana meat and leather products
- the economic and organisational sustainability of iguana breeding at the farm and community level
- the feasibility studies performed within the frame of the Project for the implementation of the different activities
- any other subject the team may find relevant

## 4 IMPLEMENTATION

- 4.1 The team work will be performed during 12 days (between January 3 and January 16, 1996, including these two days).

- 4.2 The team should base their work on the review of relevant documents, visits to the Project area in Costa Rica and Panama, meetings with APIV personnel, local authorities and other representatives of the local population, other Projects in the wildlife management area in Central America, and with representatives of the Norwegian Embassy in Managua. The detailed program for the study is the responsibility of the team, and the team should include the meetings and visits which are considered necessary.

- 4.3 All practical arrangements for the study are the responsibility of APIV if not specified otherwise. APIV will propose a program for the study. Upon consultations with the team, APIV will assist the team with the final organisation of field visits and meetings.

- 4.4 APIV will provide the team with all relevant documents, including the following:

- The contracts between APIV and NORAD 26 June 1991 and 3 October 1991;
- The Project Document "Iguana management. A model for rural development", September 1990, for the years 1991-1995;
- Project Review of CAM-023 Iguana Management Project, April 1993;
- APIV's comments to the Project Review of April 1993;
- Agreed Minutes from Annual Meetings between NORAD and APIV, in particular from meetings held January 1994 and December 1994;
- Project budgets and plans for the years 1993, 1994 and 1995;
- Progress reports for 1993, 1994 and 1995;
- Published materials, detailed internal reports and other documentation elaborated by APIV and not normally sent to NORAD;
- Letter signed by 57 persons from the Project area or with other connection to the Project, dated 14 May, 1995 and sent to costarican and international institutions;
- Newspaper articles raising criticism of the Project, including articles in La República, Costa Rica, 24 and 25 September 1995;
- Letters from APIV in response to the above mentioned letters and newspaper articles.

- 4.5 The team will be composed of four persons:
- Odd Terje Sandlund, biologist, Norway (team leader)
  - Hernaldo Santos, economist, Nicaragua

- Carlos L. de la Rosa, biologist, Costa Rica
- José Carlos Vasquez Morera, social scientist, Costa Rica

Sandlund and Santos will enter into contract with NORAD, while de la Rosa and Vasquez will enter into contract with APIV.

- 4.6 The team shall at the beginning and at the end of the review meet with representatives of the Norwegian Embassy in Managua for consultations.

## 5 REPORTING

At the end of the review, the team shall deliver a draft report, with a copy to APIV. NORAD and APIV shall submit their comments on the draft report to the team leader within two weeks after its delivery. After having received these comments, the final report should be finished and sent to NORAD within four weeks. The report should be written in English, and should not exceed 20 pages, including an introduction with a summary of the subject of study, major conclusions and recommendations. The report should additionally contain a list of performed meetings, visits and consulted documents. In addition to a printed copy of the report, it should be delivered in floppy disc in Word Perfect or Microsoft Word.

Managua, 8 mai, 1996

Tom Tyrihjel  
Chargé d'affaires  
Norwegian Embassy, Managua



## Annex 2: Itinerary for the field work of the evaluation team

### Programme of work

Time	Activity	Place
<b>3 January 1996</b>		
0900-1130	Presentation of the team Presentation of general guidelines for Norwegian development cooperation Presentation of previous evaluation (1993) Discussion of Terms of Reference	Norwegian Embassy, Managua
1400-1600	Internal team meeting	Norwegian Embassy, Managua
<b>4 January</b>		
0700	Transfer from Managua to San Jose	
1330-1730	Meeting with APIV technical staff	APIV headquarters, San José
<b>5 January</b>		
0900	Transfer from San Jose to Iguana Reserve	
1100-1200	Meeting with field staff	Iguana Reserve, Turrubares
1300-1500	Visit technical facilities	Iguana Reserve, Turrubares
1500-1800	Meeting with field staff	Iguana Reserve, Turrubares
<b>6 January</b>		
0900-1200	Visit installations, Iguana Park	Iguana Park, Turrubares
1400-1600	Meeting with regional direction, National Institute of Agrarian Development (IDA), Central Pacific	Orotina
1600-1900	Meetings with local community members	Coopebarro
1900	Transfer to San Jose	
<b>8 January</b>		
0900-1200	Report drafting, evaluation team	San José
1400-1700	Meeting with women's artisanal group	Puriscal
<b>9 January</b>		
0800	Transfer to Iguana Park	
1100-1300	Meeting with regional Director of Education, and school staff	Iguana Park, Turrubares
1400-1800	Inspection of Salinas II area	Salinas
1800	Transfer to San Jose	
<b>10 January</b>		
0900-1100	Meeting with Ministry of Environment and Energy (MINAE)	San José
1200-1800	Report drafting, evaluation team	San Jose
<b>11 January</b>		
The team split up: CdIR, JcV, HS, left for Panama; OTS stayed behind in San Jose		
<b>Trip to Panama</b>		
0700	Transfer to Panama	
1230	Transfer to Chitré	

Time	Activity	Place
<b>12 January</b>		
0800	Transfer to Llano Grande	
0900-1000	Meeting with community representatives	Llano Grande
1000-1200	Visit project installations and meetings with families of the community	Llano Grande
1300-1700	Visit to agroforestry sites	Llano Grande
1700	Transfer to Chitré	
1830	Dinner with Governor of Herrera Province and regional representative of the National Institute of Natural Resources	Chitré
<b>13 January</b>		
0900-1000	Meeting with regional representative of Education and school staff	Chitré
<b>Activities in Costa Rica (OTS)</b>		
<b>11 January</b>		
0900-1200	Meeting with staff of the National University, Wildlife Management Program	Heredia
1300-1500	Meeting with former employee of APIV	Alajuela
<b>12 January</b>		
<b>Evaluation team reunited</b>		
1000-1300	Report drafting	
1400-1600	Meeting, Norwegian Embassy, Interview with IUCN staff (via telephone)	San José
<b>15 January</b>		
0900-1700	Report drafting	San José
<b>16 January</b>		
0900-1200	Report drafting	San José
1300-1700	Meeting with APIV and NORAD staff to present draft report	San José
End of field work		

## Annex 3: People met by the evaluation team

### Summary of persons met

#### 3 January 1996

*NORAD, Managua*

Hans Peter Melby

Evaluation team (Odd Terje Sandlund, José Carlos Vásquez, Hernaldo Santos, Carlos de la Rosa)

#### 4 January 1994

*Asociacion Iguana Verde, APIV*

Dagmar Werner,

Mario Rocabado, Lawyer, consultant,

Alner Palacios, lawyer,

Alekcey Chuprine, sociologist,

Roberto Vides, biologist,

Daisy Rey, subdirector, APIV

Miguel Cifuentes, WWF, Central America Region

Mario Boza, CCC, advisor APIV

Dario Sáenz, marketing studies for APIV

Marcos Quiróz, marketing studies for APIV

Gillermo Matamoros, marketing studies for APIV

Sergio Torres, director Carara Biological Reserve

Oscar Castro, administrator APIV

Ana Elena Valdéz, translator

Evaluation team

#### 5 January 1996

*Iguana Park, Turrubares*

Oscar Castro, Alner Palacios, Alekcey Chuprine,

Dagmar Werner, Roberto Vides, APIV

Ileana Mora, UCR, Centro de Tecnología de la Carne

Mercedes Sisfontes, sociologist, APIV

Róger Zumbado, General manager of Iguana Park

Carlos Hernández, tree nurseries

Walter Trejos, maintenance of iguanas

Carlos Leiva, maintenance of macaws

Alexander Núñez (a.k.a. zancudo), trail maintenance, fence rows

Herminio Venegas, trails, fences

Dr. Miguel Méndez, veterinarian

Evaluation team

#### 6 January 1996

*IDA staff, Ovotina*

Roy Núñez, IDA, Regional Director

Constantino Mondragón, IDA

Alekcey Chuprine, Dagmar Werner, APIV

Evaluation team

*Community members around Iguana Park*

Alvaro Núñez Espinosa

Rafael Rojas

Blanca León

Toño León

José Francisco Jiménez

Mercedes Sisfontes, APIV

Evaluation team

#### 8 January 1996

*Puriscal*

*Women's Association in Turrubares, Puriscal & Mora*

Luz María Barrantes

Teresa Barrantes

Aracely Bermúdez

Crisable Rojas

Magdalena Rojas

Ivete Valverde

Zoraida Jiménez

Mercedes Sisfontes, Dagmar Werner, APIV

Evaluation team

#### 9 January 1996

*Meeting with representatives of the Ministry of Education, MEP Iguana Park*

Eliecer Núñez Madrigal, Supervisor MEP

José Joaquín Vargas, Director of Dario Flores school

Luis Sisfontes, Prof. Physical Education

Francisco Fonseca, Advisor and Supervisor

Selmira Rosales Rosales, educator

Marco Tulio Ramírez, Regional Director of Education

Mercedes Sisfontes, Dagmar Werner, Roberto Vides, FPIV

Rosa Irene Schiezeth, translator

Evaluation team

#### 10 January 1996

*Ministry of Natural Resources, San José*

Carlos Manuel Rodríguez, Sub-director National System of Protected Areas, SINAC

Dagmar Werner, FPIV

Roberto Vides, FPIV

Rosa Irene Schiezeth, translator

Evaluation team

*APIV. Biological research, technology and education questions*

Dagmar Werner, Roberto Vides, FPIV

Evaluation team (Sandlund, de la Rosa)

Rosa Irene Schiezeth (translator)

#### 11 January 1996

*Heredia and Alajuela*

Christopher Vaughan, professor, Universidad Nacional, Heredia

Frederica Piza, veterinarian, former employee of APIV

Evaluation team (Sandlund)

#### 12 January 1996

*Llano Grande, Panama*

Ariel Urriola, person in charge of project in Panama

Alner Palacios, FPIV

Daisy Rey, FPIV

Evaluation team (de la Rosa, Vasquez, Santos)

*Norwegian embassy*

Liv A. Kerr, Ambassador,

Hege Fisknes, Ass. secretary  
Evaluation team (Sandlund)

*Telephone interview with*  
Vivienne Solis, senior officer at IUCN, San Jose

### **13 January 1996**

*Chitré, Panama*

Samuel Ibarra, teacher in Ocu school  
Telba de Rodriguez, teacher in Llano Grande  
Griselda de Rodriguez, teacher in El Calabazal  
Daisy Rey, Ariel Urriola, Alner Palacios, FPIV  
Evaluation team (de la Rosa, Vasquez, Santos)

Meeting with Governor of Herrera Province  
Regional representatives, Municipal representatives  
Daisy Rey, Ariel Urriola, Alner Palacios, FPIV  
Evaluation team (de la Rosa, Vasquez, Santos)

### **16 January 1996**

*APIV, San Jose, Costa Rica*

*Final Meeting*

Hans Peter Melby, NORAD  
Dagmar Werner, Mario Rocabado, Alner Palacios,  
Alekey Chuprine, Roberto Vides, Daisy Rey,  
Mario Boza, APIV  
Evaluation team (Sandlund, de la Rosa, Vasquez,  
Santos)

## **Annex 4: Proposed contents of a "Technical management package"**

The following list of topics is only one of several possible ways to bring critical and important information to those farmers or land-owners that want to participate more actively in the green iguana raising. It is not exhaustive nor the only information they would need. However, we feel it is essential for the long-term success of iguana farming as an economic alternative to farmers near parks or within buffer zones, to have this information available to them. The manual should be presented with a training course or workshop to interested farmers.

### ***The Green Iguana: a Manual for Farmers***

So, you want to raise iguanas?

- The different levels of iguana farming
- Doing it all (from egg to meat and leather)
- From 7-month iguana to adult
- Keeping the iguanas in the patio and farm
- Iguanas as family food supplements
- Iguanas as pets
- Iguanas for tourism

The biology of the green iguana

- Habitat requirements
- The forest and the tree species that iguanas need
- The natural enemies of the iguana

Food and nutrition

- What to feed them
- How often to feed them
- Water
- Vitamins and feeding supplements

Housing and raising environment

- Egg laying and care of eggs (incubation)
- Hatchlings
- Cages for juveniles
- Heating and lighting
- Substrate
- Humidity and ventilation
- Cleaning and maintenance of the cages

Reproduction

- Mating and other reproductive behaviors
- Nesting areas and egg laying
- Transporting the eggs to the hatching facilities

Diseases and troubleshooting

- The veterinarian, best allied of the iguana farmer
- Parasites (internal and external)
- Wounds and first aid
- Diseases and illnesses common to young iguanas

Legal aspects of iguana farming

- Laws and regulations affecting iguana farming and use

- Permits and follow up

#### Processing and marketing of products

- Meat: Health regulations, butchering, sanitation, packaging, etc.
- Leather: Killing, skinning, skin preparation, tanning, cutting, finishing
- Live iguanas (for pets or stock)

#### Conclusions

#### Contact persons and institutions

- FPIV/APIV
- MINAE
- Others

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**NINA•NIKU  
PROJECT  
REPORT**

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**NINA  
Norwegian Institute  
for Nature Research**

**NIKU  
Norwegian Institute  
for Cultural Heritage  
Research**