
Technical Report

**Association for the Management of
Protected Areas
(687-0110)**

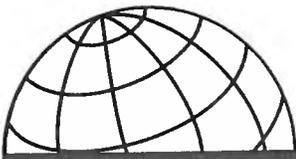
**Export Trade in Madagascar's Wildlife:
An Aid to Conservation**



**Submitted to
United States Agency for International Development/Madagascar
under contract number PCD-1406-I-00-0073-00**

**Submitted by
Tropical Research and Development
Gainesville, Florida, U.S.A.**

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**by
Martin Jenkins**

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1. Introduction

Madagascar possesses remarkable biological richness. In particular it has an extremely high complement of endemic species (that is, species that are found nowhere else.) It is also a country suffering extreme environmental problems. The most important of these are the degradation of habitats and soil erosion. Unsustainable forms of land use, chiefly tavy (slash-and-burn cultivation) in moister regions and burning to create pasture for cattle in western drier areas are responsible for this habitat loss and erosion (see, e.g., Jenkins, 1987; Mittermeier et al., 1987).

Most of the population of Madagascar is rural. It is engaged largely in subsistence agriculture. The average annual rural income is around US \$200. The rural poor are the persons engaged in these unsustainable forms of land use. Both their activities and their well-being will have to be addressed if any long-term solution to Madagascar's environmental problems is to be found. A major component of any solution that maybe found will have to be a shift from unsustainable to sustainable resource use in rural areas. One approach to achieving sustainable use of resources is to provide alternative methods for income generation so as to decrease the amount of unsustainable agricultural activity undertaken.

1.1. Exploitation of species for the export market

1.1.1. Background

The sustained, managed exploitation of various animal and plant species for the export market is an area that may provide possibilities for income generation. Within a wider political context such exploitation is seen as important for two major reasons. First, it may provide a mechanism for increased private-sector involvement in natural resource management and in the maintenance of biodiversity. Private-sector involvement is widely believed to be an important step in the further development of Madagascar's capacity to deal effectively with the management of its own resources. Second, the sustainable exploitation of certain plants and animals should help demonstrate that natural resources have a reliable economic value. This should reinforce arguments for managing them on a commercial scale and help allay concerns within the country that biodiversity has been allotted too high a priority in the current National Environmental Action Program.

It is vital to bear in mind, however, that the exploitation of wild resources is a highly controversial subject at present, particularly when viewed in the context of biodiversity conservation. This controversy emerges not only from scientific debates on theoretical and practical problems of sustainable resource management but also from differences in the more emotionally charged—and ultimately less reconcilable—ideological and philosophical approaches to conservation, development, and animal welfare. Any development in this area in Madagascar will thus have to proceed with great caution, taking full cognizance of these debates.

1.1.2. The current state of the trade

At present there is an active interest overseas in Madagascar's fauna and flora. This interest stems from a variety of sources: currently the single most important export (excluding timber, raffia, and marine fisheries) is in one plant, the Rosy Periwinkle, *Catharanthus roseus*, which is used by the pharmaceutical industry. The widest range of interest, however, is shown by collectors of exotic animals and plants, usually as live specimens but in some cases, such as butterflies, as mounted specimens.

A preliminary study has indicated that this trade (excluding the Rosy Periwinkle) is worth somewhat over \$1 million annually (Jenkins and Rakotomanampison, 1994). There is also an unknown quantity of illegal, undeclared trade. The principal biological groups dealt with are reptiles and amphibians, butterflies and moths, birds, orchids, succulents, aquatic plants, and palm seeds. The trade appears to be largely in the hands of a small number of exporters; some parts of it, particularly the reptile and amphibian trade, have been growing rapidly in recent years. These exporters and a small number of middlemen benefit considerably from the trade. However, evidence suggests that the local people who supply most of the goods exported receive considerably less than 10 percent and perhaps as little as 1 percent of the export value of the goods (Jenkins and Rakotomanampison, 1994; C. Lippai, pers. comm., Nov. 1993).

1.1.3. International perceptions of the trade

International trade in a number of the species exported is controlled by the Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES). The CITES secretariat and other organizations that monitor international trade in wild animals and plants have become increasingly concerned about the growing scale of the trade and the fact that little appears to be being done to control it. Pressure is mounting for the trade to be curtailed, or even to be halted entirely, unless significant efforts are made to improve the manner in which it is controlled.

1.1.4. Improvements to be undertaken to reform the trade

Thus, while the trade may well present opportunities in the future for the generation of income to support rural communities, in its present form its continued existence must be regarded as in doubt. Clearly a number of steps have to be undertaken before the trade can be developed so that it can be directed toward alleviating environmental pressures within the country. Four main areas can be identified: national-level reforms; an improved understanding of the socioeconomic and environmental impact of the trade system as it currently operates; investigation of the market potential of various species and products; development of pilot projects in priority areas.

A national control system.—A fundamental requirement for all further activities is the putting in place of a reliable and well-enforced system of national control. Without such a system it is impossible to envisage the setting up of more innovative projects for the development of the trade. Moreover, such a system will be necessary to convince international bodies such as CITES of Madagascar's intention to control the trade adequately. Such a system has three major components: an adequate legislative framework; a functioning organizational and institutional setup; the professionalism and commitment of persons responsible for implementing the system.

Without clear evidence of progress in this in the near future, it is very probable that CITES could shortly take action to close down a major part of the trade over which it has influence (that is, trade in plant and animal species included in the appendices to the convention). Such action might well be perceived within Madagascar as inappropriate because it will affect a number of species not regarded as threatened with extinction and undoubtedly capable of sustaining moderate levels of exploitation. This underlines the fact that Madagascar will have to send clear signals to the international conservation community that it is taking the matter in hand and that it is able to manage its resources for export as it sees fit without outside interference. The first of these signals, namely the setting of export quotas for species listed in Appendix II of CITES, can be undertaken very rapidly and without the need for significant legal and structural reform.

A major part of the initial phase of the TRADEM project (studies 1–3 below) deals directly with the reform of the national control system.

Further studies on the existing trade system.—A second requirement is a fuller understanding of the system as it currently exists, both in its impact on the populations of the species concerned and in its socioeconomic impact on those involved in the trade. Only by understanding this can there be hope that the trade will be managed in a sustainable way and directed so that it brings enhanced benefits to rural peoples. The importance of understanding the social context in which systems operate is discussed in more detail below.

To gain this understanding requires study of the biological status of the species involved in the trade, a study of the trade network as it currently exists, and an analysis of the economics of the trade. It is also important that the trade is placed within the context of other forms of natural resource use. Studies 4–7 below will address these issues.

An overseas market study.—Before any significant investment is made in the development of projects for the harvesting of natural resources for export, an analysis of the market potential for the products will have to be undertaken. No such projects should be developed unless there is confidence that there is a sustainable economic market for the products of such projects. Such an analysis should also look at international green political issues, specifically in examining the political acceptability of certain products, and particularly the involvement of development and conservation organizations in their harvest and marketing. This is discussed in more detail below, and Study 8 below will address this issue.

Development of pilot projects.—Pilot projects for enhancing the benefits gained by local people from the trade should be developed. This is the most complex of the activities to be undertaken and will require extremely careful planning. Several practical and theoretical questions have to be addressed before such projects can be put in motion.

In the first place, such projects are contingent on the successful execution of points a national control system, studies of the existing trade system, and an overseas market analysis, as detailed above. In the second, there must exist a local infrastructure adequate for the projects to operate. That is, these projects should be seen as part of a suite of activities to be undertaken in any given area and should not be regarded as operating in isolation. Moreover, it is likely that in some areas no project can be identified that meets the criteria set out below. That is, there should be no presumption that a project of this nature will automatically be found to fit all areas chosen to work in. In some areas, perhaps even the majority other solutions will have to be looked for. This underlines the fundamental importance of looking at each area individually and attempting to develop an integrated approach to managing in its resources appropriate to the local conditions.

These pilot projects should be seen as helping to develop, on an experimental basis, technologies for sustainable natural resource exploitation in particular ecotypes, technologies that may then be applicable in different locations and may sometimes have relevance to countries outside Madagascar. It should also be remembered that the major problems to be overcome are as likely to be social and behavioral as to be technological—and often more likely.

Again, on an experimental basis, these projects may also be seen as attempting innovations in private-sector involvement in natural resource management. At stake here is the participation of the private sector, whether this is individuals, local cooperatives, village communities, NGOs, or private companies, in the exploitation and management of land that remains under state ownership. This does not mean the privatization of state lands or of the state bodies ultimately responsible for those lands; rather it contemplates the inclusion of the private sector as a partner in the management of state-owned lands. It also includes the involvement of the private sector in development and the marketing of products. This is also a controversial issue, more so at local and national levels than at the international level.

More specific considerations to be addressed include the legal, social, economic and political contexts of the proposed innovations.

The legal context.—Any system that is set up must operate within a legal framework. Thus, for example, a system of harvesting of resources from within a *réserve naturelle intégrale* (R.N.I.) cannot be considered because it is currently against the law. Setting up any such system (e.g., the harvest of *Neodypsis decaryi* because palm seeds from R.N.I. 11 Andohahela) would entail either a revision of the regulations controlling access to R.N.I.s or a reclassification of the area to be-harvested. More generally there will be a need for a legal definition of the relationship

between the state and the parts of the private sector that become involved in the exploitation and management of state lands.

Where access to a resource is legal, mechanisms will have to be put in place to control all access. Only in this way will it be possible to hold the rate of exploitation to a sustainable level and to direct the exploitation toward desired ends (the alleviation of pressure on natural habitats). Free or unlimited access, in other words, is likely to result in a tragedy of the commons.

It is conceivable that control of access may be achievable at the local community level (by self-policing through local associations) although it is more likely that legal back-up will be required.

At the national level, it is likely that legal controls may be necessary to allow resources produced for export from such projects to compete successfully with products obtained from other sources. Under present conditions, current exporters will be able to obtain chameleons, for example, for export from uncontrolled sources cheaper than those produced by sustainable management projects. Without some constraint on the export of the former, export of the latter will not be economically viable. (This is discussed further under "economic context" below.)

The social context.—Before setting in place any system for the injection of cash into largely subsistence-based local communities, and especially any system based on the consumptive harvest of natural resources with the ultimate aim of conserving those resources, it is extremely important to understand the social context in which the system will operate.

There are two principal reasons for this. To stand any chance of long-term, sustainable success, it will be necessary to understand the felt needs and aspirations of the local people. That is, local people will have to participate willingly in any systems that are set up. Land-use practices, including those that may lead to long-term damage to natural resources, may be determined at least as much by social as by economic factors. Without understanding these social factors, increasing the purchasing power of local communities may actually accelerate rates of degradation of habitats, an effect precisely opposite to that intended.

For example, in Madagascar an implicit assumption is usually made in attempting to solve the problem of "tavy" (slash-and-burn or shifting agriculture/farming). Namely, that tavy is an activity borne of necessity rather than one actively chosen. If other, economically more attractive forms of activity are presented to those who practice tavy, it is assumed that these will be adopted in preference to tavy, which will therefore diminish in extent. It is not clear that this assumption has been demonstrated to hold. It appears in many areas where tavy is carried out that it is a favored form of economic activity. If opportunities for other less environmentally damaging forms of activity are presented, these may or may not be taken up—but there is no reason to assume that the amount of tavy will decrease.

Similarly, in many parts of the south and west, extremely high social value is placed on the ownership of cattle. One of the major threats to natural habitats in this region, including those in protected areas such as R.N.I. 11 Andohahela, is clearance of forest for cattle grazing. A system for generating more cash in these communities, for example by harvest of natural resources, would result in more cattle being purchased and increased damage to natural habitats rather than the reverse.

Clearly, therefore, providing of increased opportunities for gaining income will not in itself necessarily be enough to lessen or prevent destructive forms of land use and it may, as illustrated above, even be counterproductive. For this reason, projects such as this can only be looked at as forming one possible component of a long-term, integrated, land-use strategy for a given area. Other components of such a strategy should include:

- Protection of areas critical for biodiversity conservation, watershed management, etc. There are likely to be some areas where no forms of consumptive use are to be allowed at all. Such areas will need active protection.
- "Sensibilization" of the local population to the value of maintaining natural habitats.
- Soil-erosion prevention and water management to allow better use of areas already cleared for agriculture.
- Reforestation (natural or plantation, whichever is more appropriate) to provide resources such as fuelwood, building materials, and fodder.
- Controlled access to natural resources for subsistence use (e.g., medicines, food, building materials).
- Investigation of potential for tourism: provision of accommodation, food, guides; revenue from park fees.
- Development of other small-scale rural industries to provide income (e.g., silk-farming, fruit-growing).

As stressed above, each area will have its own best solution to its long-term management, which may involve some, or occasionally all, of the above. With the limited resources available for such management, priorities for action will have to be carefully chosen. Thus the development of projects concerning, in this case, nontimber natural products will have to be weighed against other options for action in any particular geographical area.

The economic context.—Any projects that are set up will have to be economically viable in the long term. Certain criteria will have to be met.

- Does the market exist?
- Can the project satisfy the market in terms of quantity, quality, price, reliability of supply, timeliness of supply?
- Can the project compete with other suppliers both within Madagascar and from other countries?

Decisions will have to be made whether to work in cooperation with existing operators or to set up in competition with them. This directly addresses another aspect of private-sector involvement in natural resource management.

If these projects are to cooperate with existing operators, the latter will have to perceive some advantage. This advantage may lie in opening up new areas/species of supply, in providing products reliably and at a competitive price, or in opening up new markets (through value-added "green" marketing). Under present conditions, it is unlikely that the first two of these will be applicable. This is because the market currently operates essentially as a free one. Operators pay very little indeed for the products they export and show great alacrity in obtaining the specimens they require, even if these are found in generally inaccessible regions. The third is a more likely possibility, but here great care will have to be exercised that operators do not already have a dubious reputation among "green" consumers in the market countries.

Cooperation with existing operators is therefore more likely to have to be obtained through an element of coercion. Enforcement of existing regulations and the introduction of new ones (to be recommended under the review of the existing control system) should make it more difficult for existing operators to obtain specimens for export. They should thus be more willing to cooperate with projects that can assure them of a legal and reliable supply.

The alternative of setting up in direct competition with existing operators will also require the enforcement of regulations to "level the playing field" and ensure that these projects can compete on a fair basis. This will also entail the setting up of an exporting and marketing structure that will require substantial investment.

Economically, cost-benefit analysis will have to be undertaken to ensure that the proposed harvest system will be profitable in the medium to long term. There is a danger that more resources will be invested in setting up the system than will ever be earned by it. For systems that are based on the harvest of wild populations of animals and plants to be sustainable, it is likely that harvest rates in any given area will have to be low. The returns will be correspondingly low. Therefore, these systems will be small to medium scale at best and are unlikely to generate income greater than a few thousand (or conceivably several thousand) dollars at most in any one area. Obviously this is still a considerable sum compared to the average rural income, but is not large compared

with the amounts likely to be expended in setting up the system. This further underlines why such activities should be considered only as part of a suite of activities to be undertaken in any given site.

Where systems are based on increased production through farming, ranching, or cultivation (e.g. butterfly farms, orchid gardens) yields and profits may be considerably increased. The possibility also exists of increasing revenue through tourism. However, these systems require greater initial investment, greater commitment to sustain them, and greater training and expertise among the operators. Political considerations, discussed below, indicate that this type of project is the most likely to succeed in the short to medium term.

Methods of ensuring reasonably equitable methods of income distribution must also be considered. That is, if systems are set up so that only a few individuals or families benefit in any one area, this will have little impact on land-use practices and may give rise to resentment and hostility among those who do not benefit, with counterproductive results. Hence, the possibility of establishing village-based cooperatives should be investigated. The tying-in of rights to harvest for certain communities with contingent responsibilities for habitat protection or management may be one way of ensuring equitable distribution of benefits and translating these benefits into improved land management.

The political context.—The influence of the international conservation community in all its facets will have to be taken into account in the development of any pilot projects. First, this is because they are likely to have an influence on the long-term stability of export markets of wild-life products. The recent campaign, chiefly in Europe and North America, to ban the wild bird trade is a case in point. Although it has yet to succeed in its final aim of completely halting the trade, it will undoubtedly increasingly affect the global market for wild-caught birds.

Second, the involvement of conservation and development groups, which are ultimately funded in large part by Western governments and individuals in schemes for the exploitation of wild resources, is likely to become highly controversial. Involvement in some of these schemes may well create as many political problems as it solves.

The degree of political acceptability is unlikely to be established entirely on a rational basis—that is, on the ability of the resource in question to be sustainably harvested. Thus, for example, involvement in the harvest—or even the captive breeding—for export for the pet trade of geckos and chameleons will almost certainly cause great controversy, while the production of butterflies and moths through enrichment planting, ranching, or farming will probably not. Similarly, involvement in the collection of wild orchids for export for the horticultural trade will probably cause problems even if it is shown to be sustainable (although this is unlikely for biological reasons), whereas cultivation of orchids in local nurseries for export will be acceptable as will controlled harvest of, for example, wild palm seeds.

It must be stressed that these influences cannot be ignored simply because they may not be generated on a completely rational basis. Their impact is real and will not only materially affect the likelihood of success of any given project, but also have wider implications for the organizations involved. Certainly attempts can be made to influence opinion in the market countries and in international conservation circles, but the difficulty of this should not be underestimated. In the initial stages, at least, of a project such as TRADEM, far more benefit will accrue from working with noncontroversial products and harvesting or cultivation regimes. Effort should therefore be directed to start with known and less controversial products and on investigating new minor forest products that are not live animals or plants (e.g., new foodstuffs, natural dyes, and aromatics).

1.2. Some preliminary conclusions

On the basis of the various constraints outlined above, it is evident that TRADEM should be undertaken in a strategic fashion. The keynote should be pragmatism, and a phased approach should be adopted. After the preliminary stages of national-level reforms and the basic research outlined above, pilot projects may be undertaken. These should be simple, low tech, small- to medium-scale, and noncontroversial. Almost certainly this will involve husbandry of resources (farming, ranching, horticulture) rather than harvest from wild ecosystems. Possibilities of wild harvest, higher technology systems, and more sophisticated and speculative approaches such as the generation of royalties for genetic material (pharmaceutical compounds, new horticultural plants) should come later.

2. Scopes of work for pilot studies to be undertaken

2.1. Study 1. A review of the current export control system for Madagascar's fauna and flora.

Purpose.—To review the shortcomings in the current system for the control of exports of wild species of Malagasy plants and animals, particularly those covered by CITES, in order to make recommendations for the reform of the system so that the trade can be developed along controlled, sustainable lines.

Background.—The rapidly increasing rate of export of plants and animals from Madagascar, while acknowledged to be bringing revenue into the country, is also a source of increasing concern to the international organizations charged with controlling the trade. There is a widespread perception that the trade is not adequately controlled and certainly not managed on a sustainable basis. There is, therefore, an urgent need for the current control system to be reviewed and for reforms to be put in place.

Without these reforms it is impossible to envisage the setting up of any innovative projects designed to allow local communities to benefit from the trade.

Work to be done.—The current system has already been reviewed in some detail, and this project should therefore concentrate on specific concrete recommendations for improving the system.

1. Review of national legislation categorizing animal species. Some of the names included on the lists at present are not currently accepted scientific names, and it is unclear which species they refer to (e.g., *Felis ochreata*). Several highly threatened species, particularly birds, are at present unprotected. These should be included on the list of protected species. Moreover some endemic species of birds of prey are currently included in the list of pest species. Their status should be reviewed.
2. Introduction of legislation covering plants. The legal status of plant species is at present unclear. This should be reviewed and lists of plants to be legally protected should be drawn up.
3. Review of the *permis de chasse* system so that collecting quotas are allocated per species, a realistic open season is declared, and realistic dues are collected. The agents responsible for overseeing the system and collecting dues should be clearly identified and an accounting system established.
4. Recommendations for the establishment of a Scientific Authority independent of the current CITES Management Authority. Its role should include annual setting of quotas; regular inspection of export, captive-breeding, and horticultural activities; assistance in control through identification of specimens in trade;

identification of species in need of further study and implementation of such studies.

5. Developing a quota system for export of species. Questions to be addressed include how overall quotas are to be determined and how they are to be divided among registered exporters. Possibilities include allocation on a first-come first-served basis, by equal division, or by ballot (see study 2).
6. Developing a system for accurately recording the origin of specimens in trade (see study 2).
7. Developing a system for accurately assessing the value of specimens exported so that realistic export taxes can be imposed.
8. Setting up a financial system so that revenues derived from taxes on export and collection are used to finance the control system. Any surplus should be used to develop projects aimed at the maintenance of biological diversity in Madagascar.
9. Providing training for enforcement officers and other staff to ensure that the whole system becomes more professional.
10. Reviewing the current system used for allocating licenses to cultivators and exporters.

This work should be undertaken in close cooperation with the current CITES Management Authority (Direction des Eaux et Forêts). The Commission Tripartite may be the appropriate forum for the development of a Scientific Authority.

Outcome.—A detailed series of recommendations outlining legal and institutional reforms to be undertaken.

2.2. Study 2. Design of a monitoring system to control wildlife exports from Madagascar

Purpose.—To design a system capable of accurately tracking the export of wild plants and animals from Madagascar, thereby ensuring that any quota levels that may be set are accurately adhered to.

Background.—The export of wild species of plants and animals from Madagascar at present brings considerable economic benefits to the country. It is also, however, an increasing cause of concern to international organizations that monitor this trade and are showing signs of wishing to curtail or even stop the trade altogether. One of their principal concerns is that the trade is not adequately controlled. It is widely agreed that one of the best ways to control the trade is by setting quotas for export of individual species. If a schedule of quotas is to be implemented, it must be capable of being enforced. A prerequisite of enforcement is that exports are closely monitored.

This project should follow on from Study 1 (Review of current export control system) and should be seen along with Study 3 (Manual of identification of exported reptiles and amphibians) as part of the implementation of the recommendations from this project.

Work to be done.—The possibility of establishing a two-tier system should be examined—that is, one that is capable of monitoring the numbers exported of a wide range of species but also the individual specimens exported of a smaller range of species.

1. A quota control system. This should be a straightforward PC-based system. Species for which export quotas have been established should be entered into the system, along with the annual quota allocated. When export licenses are allotted for each species, the number of individuals licensed for export is entered in the system. A copy of this is held at the sites where exports are controlled (usually Ivato) and the actual number of specimens exported in each shipment is entered. Verification of the species concerned should be carried out with the aid of identification guides prepared under Study 3.
2. A system for controlling individual specimens. If setting up a system of licensed collection for export of a few species for high-value/low-volume trade is envisaged, a system will have to be developed for monitoring individual specimens of the species concerned to ensure that those specimens exported are the ones for which collecting licenses have been allocated. Such a system will probably entail the use of unique, numbered tags.

The institutions responsible for the running of the system should be identified. Ultimate responsibility should reside with the CITES Management Authority (at present the Direction des Eaux et Forêts). This system should be developed in

cooperation with the DEF. They, in cooperation with Customs authorities at points of exit from the country, should be responsible for checking quotas allocated against shipments. The Scientific Authority should be responsible for the establishment of the quotas and should act in an advisory capacity ensuring that the system is proficiently run.

Outcome.—A model operating system with supporting documentation along with a concise description of how the system should operate in practice.

2.3. Study 3. The production of a manual of identification of the most commonly exported Malagasy animals (for use primarily by nonspecialists).

Purpose.—The manual will be used primarily by customs and enforcement officers to assist in the control of shipments of Malagasy animals, particularly reptiles and amphibians. It will be of use both in Madagascar, in entrepôts, and in importing countries.

Background.—A substantial live animal export trade exists in Madagascar at present. Reptiles and amphibians are at present economically the most important. At least 120,000 specimens are exported annually, and the number is growing rapidly. Their export generates a substantial income, which could be of benefit both to the country as a whole and to rural communities where the animals are collected. Of the 440-odd species of amphibians and reptiles, around 80 appear to be regularly exported in reasonable numbers, with many others probably exported occasionally in small quantities. While most of the species involved do not appear to be threatened with extinction at present, concern has been expressed about the effects of the trade on a few, particularly in highly collectable genera such as *Phelsuma* and *Chamaeleo*.

To ensure that the trade is not having a deleterious effect on wild populations of the species concerned, it is essential that it is adequately monitored. A major problem in monitoring is the lack of reference materials enabling enforcement officers to identify the species they are charged with controlling. At present exporters are relied on to declare accurately the contents of their shipments. Enforcement officers can verify the number of specimens exported by head counts and can also identify them approximately (e.g., as *Phelsumas*, *Uroplatus*, other geckos, Chameleons etc). However they lack the expertise to identify the majority to species level. There is thus substantial likelihood of rarer and more valuable species within a genus being misdeclared as similar, commoner species. The likelihood of such misdeclaration will almost certainly increase in the future if, as is envisaged, quota systems for individual species are to be introduced and more realistic export taxes are levied based on the market value of the specimens exported.

The manual should cover not only reptiles and amphibians but also other CITES-listed Malagasy animals, with the possible exception of the Lemuridae, all of which are listed in Appendix I and are therefore banned for export for commercial purposes, and all of which are easily recognized as lemurs by nonspecialists. It is unrealistic at present to consider preparing a manual of identification of the butterflies, moths, and other invertebrates exported. None of these is now listed in the CITES appendices.

Work to be done.—

- 1. Scope:** All Malagasy animal species listed in the CITES appendices except Lemurs will be included with a number of other regularly exported genera of reptiles and amphibians. Taxa covered should include:

Reptiles: *Boa* (Malagasy species only = *Acrantophis*, *Sanzinia*), *Brookesia*, *Caretta*, *Chalaradon*, *Chamaeleo*, *Chelonia*, *Crocodylus*, *Dermochelys*, *Eretmochelys*, *Erymnochelys*, *Geochelone* (= *Testudo*), *Oplurus*, *Phelsuma*, *Uroplatus*, *Zonosaurus*

Amphibians: *Dyscophus*, *Mantidactylus*

Mammals: *Pteropus rufus*, *Cryptoprocta ferox*, *Eupleres goudotii* (including *E. major*), *Fossa fossana*, *Dugong dugon*

Birds: *Tyto soumagnei*, *Anas bernieri*, *Coracopsis vasa*, *C. nigra*, *Agapornis cana*

2. **Design and contents:** The principal rationale behind the manual should be ease of use by those with little or no scientific training. The manual should be pictorially based as much as possible, and identification should be based on characteristics evident in the animals in the state in which they are most likely to be exported. For the majority of species this will be as live specimens, but for some it will also be as leather or tortoiseshell.

The manual should be produced in English, French, and Malagasy in a single trilingual version to minimize publication costs. Wording should be kept to a minimum.

Taxonomy should follow official CITES nomenclature for the species listed in the CITES appendices. For other groups, expert scientific advice should be sought. Synonyms should be mentioned where these are known.

Careful consideration should be given to the following questions at the design phase: Should the volume be loose-leaf or bound? Should drawings or photographs be used? Should the illustrations be in color or black and white?

It is important that duplication of effort be avoided. Therefore effort should be made early on in the project to contact all those experts, both national and foreign, who have an interest in Malagasy fauna, particularly reptiles and amphibians, to determine whether any preliminary work has already been done. Contact should also be made with the CITES secretariat to determine which species listed in the CITES appendices have already been covered in the CITES identification manuals.

Outcome.—Production of an identification manual in timely fashion for distribution to customs officers and other enforcement agents both in Madagascar and abroad.

2.4. Study 4. A study of the distribution and population levels of a number of Malagasy animal species currently collected for export.

Purpose.—To gain baseline population data on a number of species currently exploited for the export trade in an attempt to determine whether current levels of exploitation are sustainable as a first step toward establishing export quotas for these species.

Background.—A wide range of Malagasy animal species, chiefly reptiles and amphibians, is currently collected for the export market. Rates of export of many of these species have increased dramatically in recent years. There has been growing concern among international conservation organizations, including CITES (the Convention on International Trade in Endangered Species of Wild Flora and Fauna), that current export levels may not be sustainable and indeed may be posing a threat to the survival of some of the species exported. In the absence of any evidence that current export levels are based on scientific assessment of the status of the species, several international bodies are calling for the trade to be more tightly controlled or even stopped altogether. Already the European Union (EU) has taken unilateral action and banned the import of six *Phelsuma* species whose international trade is otherwise still permitted. It is also considering banning the import of frogs of the genus *Mantella*. At present *Phelsuma* is included in Appendix II of CITES, its international trade therefore being subject to monitoring. *Mantella* is not currently included in any CITES appendix but is likely to be proposed for listing at the next Conference of the Parties in late 1994.

It is widely held that the sustainable development of this trade may present an opportunity for providing increased income to rural communities, thereby relieving pressure on existing natural habitats in Madagascar. However, it is evident that at present there is a risk that trade will be shut down entirely.

It is therefore imperative that studies are undertaken to determine whether the survival of the species of most concern is indeed threatened by the trade. This would not only help to safeguard these species but also demonstrate to the international conservation community Madagascar's determination to place this trade on a scientifically based, sustainable footing.

Work to be done.—

1. **Species to be surveyed:** In the first instance, the species subject to a trade ban or threatened with a trade ban should be investigated:

Mantella (all species): *M. aurantiaca*, *M. betsileo*, *M. cowani*, *M. crocea*,
M. laevigata, *M. madagascariensis*, *M. viridis*.

Phelsuma (5 species): *P. flavigularis*, *P. guttata*, *P. seippi*, *P. serraticauda*,
P. standingi

Agapornis cana (this species is subject to an export quota under CITES; the quota should be established on the basis of a population estimate).

Other species: *Uroplatus fimbriatus*, *Chamaeleo cucullatus*, *C. campani*,
C. oshaughnessyi, *C. willsi*

2. Methodology:

With relatively limited resources of time, manpower, and money, it will be impossible to carry out detailed studies of the population dynamics of the species identified above. The objective therefore should be to obtain baseline data on the distribution, status, and reproductive biology of these species. The aim is to obtain minimum population levels to compare these with estimated collecting levels and to ensure that permitted levels of collection (i.e. quotas) are well below the level at which they may adversely affect the population.

Three approaches should be adopted:

1. Literature review, collecting all available information on the distribution, status, and biology of the species concerned.
2. Interviews with experts (field biologists, taxonomists, animal collectors and breeders).
3. Field studies based on the information gathered in 1 and 2 above. Field studies should concentrate on obtaining information on structure and density of populations in given study sites. It will not be feasible to carry out detailed autecological studies. Field studies should be timed to coincide with periods when the species concerned are known to be active.

Information gathered should comprise:

1. Known extent of distribution.
2. Habitat preferences, in particular whether the species occurs in disturbed habitats or not.
3. Population density in specific locations.
4. Reproductive biology, in particular: age at breeding; fecundity; frequency of reproduction.

Outcome.—The outcome of the research should be some very approximate (order of magnitude) estimates for population levels of the species concerned, with an indication of potential annual reproductive rates. These will then be used to derive conservative collection quotas. Using

information on postcapture mortality gained under study 5 (study of the collection network), these can then be translated to estimates for export quotas for the species concerned.

2.5. Study 5. A study of the collecting of wild specimens of Malagasy plants and animals destined for export (with emphasis on the regions chosen for pilot project development).

Purpose.—To gain a clearer understanding of the mechanism of the wildlife export trade as it currently operates. Only by doing so can any assessment be made of both the socioeconomic impact of the trade on those involved in it and the biological impact on the species of animals and plants traded. This is a prelude to any attempts to manage the trade on a sustainable basis to bring increased benefits to rural communities.

Background.—A wide range of wild Malagasy species of both animals and plants are currently exported. They are sold mainly as pets, ornamental plants, and for decorative purposes. This export currently generates a notable income for the country and appears to have considerable potential for further development. However, it is also the subject of increasing concern in the international conservation community because it does not appear to be effectively managed. This concern has increased to the point where it is likely that action may be taken at the international level to seriously reduce or even halt this trade. An essential requirement for the effective management of the trade is that it is fully understood.

At present the great majority of live animals and a high proportion of plants exported are of wild origin. They are collected widely in Madagascar, although preliminary information indicates that collection is concentrated in a limited number of favored localities. Reasonably accurate information is available on the export levels of most of the species concerned; but because there are virtually no data on mortality rates between capture and point of export, it is unclear at present how export levels relate to numbers collected and hence how they impact wild populations. There is also reasonable information on export prices and wholesale and retail prices in countries of import, but relatively little on the prices paid further down the supply chain. It is thus difficult at present to assess the economic impact of the trade on the rural communities where the collecting takes place.

Work to be done.—Any study of the collection network will have to be limited in geographical scope. A limited number of areas that are known to be collected should therefore be chosen. These should preferably be areas where pilot projects are envisaged. However, background information should be gathered on other areas known to be collected. This information should be gathered by interview with exporters (although see below) and with knowledgeable field-workers.

This project should be seen as an essential adjunct to studies 4 (study of the status of various species involved in the trade), 6 (study of the domestic market for Malagasy fauna and flora), and 7 (socioeconomic study of the impact of the trade). The feasibility of carrying out projects 5, 6, and 7 together should be examined.

1. Information to be gathered:

- a. Species collected, in what quantities, when (seasonal variation).
- b. Who does the collecting (age/sex/socioeconomic class)?
- c. Chain between collection and export. How many links? Who controls each link (i.e., to what extent are middlemen agents of the exporters)?
- d. Mortality levels at each stage.
- e. Economics of the system. Prices paid at each stage. Taxes paid at each stage (both theoretically and in reality).
- f. Form in which species is exported.

2. Methodological considerations.—Much of the information in this study is likely to prove difficult to obtain without the cooperation of those involved. This cooperation is itself likely to prove difficult to obtain in full, for a number of reasons.

First, the system at present operates essentially as a free market run by a limited number of exporters. These exporters are unlikely to be willing to divulge the economics of their trade, particularly if they perceive that the information may be used to attempt to modify or control their activities. This is because their interest is, understandably, in maximizing their personal profits by minimizing their outgoings and maximizing their income.

Second, the system at present exists in a state of quasi-legitimacy. This appears to be implicitly, if not explicitly, understood by all parties concerned. At preexport level, the major problems are:

- a. Theoretically, exported specimens of plants and animals should be artificially propagated or captive-bred. But, is rarely the case, particularly for animals.
- b. Theoretically, collection of wild animal specimens should take place under *permis de chasse*, issued by the DEF. This system was developed under colonial rule and is now outdated and inappropriate; it appears to be scarcely enforced. For example, the *permis de chasse* limit the period of collection to the dry winter months when many of the species exported are dormant and very difficult to collect. This limitation is universally flouted.

Full cooperation of the exporters will require the acknowledgement of these problems by all parties concerned, which may prove difficult. However, if it can be impressed upon the exporters that reform in the control system will take place whether they cooperate or not, then they may well perceive it to be in their interests to cooperate.

Areas where it will be difficult to obtain reliable information include these:

1. Prices paid to collectors (exporters will certainly exaggerate these).
2. Mortality rates from collection to point of export (these will be minimized).
3. Areas where collection takes place (will be concealed if they are protected (e.g., Andasibe/Perinet-Analamazaotra).

An alternative or parallel approach would be to attempt to gain information directly from those involved in collection without the knowledge of the exporters. If this can be done, it will almost certainly produce more accurate results. However, it too may prove difficult, for it seems likely that in many cases the collectors are aware of the illegal nature of the activity. Indeed, it is in the interests of the middlemen and exporters to exaggerate the illegality because it gives them tighter control over the collectors.

Outcome—The project should result in a reasonably full picture of the major collecting networks for the different groups of animals and plants exported, giving indications of principal collecting localities (by group), number of people involved at each stage in the chain (also by group), and income generated at each stage in the chain.

2.6. Study 6. A study of the domestic market for Malagasy flora and fauna.

Purpose.—To gain a fuller understanding of the importance of living natural resources in Madagascar's domestic economy, both at subsistence levels and within the cash economy. This will enable a realistic value to be placed on those resources to help strengthen arguments for their rational management. Some of these resources are also harvested for the export trade. In order to manage effectively the exploitation of species for the export trade, it is important that this harvest is placed within the context of these other forms of resource use.

Background.—Extensive domestic use is made of Madagascar's natural resources both at subsistence level and within the cash economy. Many different species are used for food, medicines, building materials, fuel, leather, and other goods or as ornamentals and pets. Some of the species so used also feature in the export trade. Concern has been expressed that some of the species exploited are being harvested in an uncontrolled and unsustainable manner. Pressure is therefore being brought to bear to control or curtail the export trade.

However, before effective management of the export trade can be put in place, it will be important to understand all the exploitation pressures placed on the species involved. This entails an understanding of the place of the species concerned within the domestic economy.

Work to be done.—This study should be seen as an adjunct to project 5 (study of the collection network). The possibility of carrying out the two concurrently should be examined.

Two components are envisaged:

1. A study of local resource use in the areas where pilot projects are planned. Such studies will deal with subsistence use and the local cash economy.

Factors to be examined:

- a. Species used.
- b. Purpose(s).
- c. Type of harvest (destructive/nondestructive).
- d. Importance of resource (qualitative assessment).
- e. Intensity of use relative to abundance of resource (qualitative assessment).
- f. Subsistence use only or also for cash economy.

The study should concentrate on two areas. First, it should identify the most important elements of biodiversity exploited in a given area rather than attempt to carry out a comprehensive survey of all resource use. Second, it should examine local use of any plant and animal species known to be exploited for the export trade.

2. Consumption in principal market centers, particularly the Antananarivo zoma, (Friday market).
 - a. Species available.
 - b. Purpose/form sold in.
 - c. Prices.
 - d. Where obtained.
 - e. Quantities available.
 - f. Principal market (tourists, expat residents, locals).

When the study is planned, consideration should be given to whether it will be realistic to carry out a complete survey of medicinal plants. Again, emphasis should probably be placed on the species known to be exported. Similarly, consideration will have to be given to whether to include fisheries.

The relationships between these forms of consumption and the export trade should be examined in detail. Preliminary data indicate that they vary considerably from group to group. For example, there is little indication of local use of *Phelsuma* or *Chamaeleo* species, which are an important part of the export trade. In contrast, the local market for orchids as ornamentals is probably more important than the export market. Similarly, the conversion of plants in the southwestern *Didierea* forests for charcoal (for both subsistence use and sale to urban markets) will in many cases far exceed any harvest for export of live plants.

Outcome.—An overview of the importance of natural resources at local levels in certain key study sites along with an indication of the commercial importance of natural resources within the domestic economic network, with particular reference to the species known to be exploited for the export trade.

2.7. Study 7. A socioeconomic analysis of the impact of wildlife collection.

Purpose.—To gain an understanding of the effects of wildlife collection on the communities that undertake it and thereby to attempt to predict the effects of setting up projects based on sustainable exploitation of wildlife in areas where this is not already taking place.

Background.—The aim of the TRADEM project is to attempt to develop sustainable wildlife exploitation in order to bring increased benefits to local communities, thereby relieving pressure on remaining natural habitats by providing alternatives to destructive forms of land use. To ensure that this happens, it is imperative to understand the effects of collecting wildlife for the cash market on those who undertake it. Only then can one have any confidence that projects based on collecting wildlife will have the desired long-term effect.

Work to be done.—This study should be regarded as an adjunct to studies 5 (study of the collecting network) and 6 (study of the domestic market). The possibility of carrying these out concurrently should be examined. In any case, this study should concentrate on the areas chosen for studies 5 and 6.

1. **The analysis should be based on the following questions:**
 - a. Who does the collecting (age/sex/socioeconomic class)? (this information will also be gathered under study 5)
 - b. How much time does collecting take? Is it a full-time, part-time, or occasional activity?
 - c. How much income is generated in absolute terms?
How much income is generated relative to other income within the family group?
 - d. What happens to the income generated?
 - e. To what extent does collecting plants and animals affect other activities undertaken (e.g., by decreasing available time, by increasing purchasing power)?

2. **Methodological considerations.**—As much background as possible should be obtained from literature survey and discussions with anthropologists/sociologists who have worked in the area.

Field study techniques should be considered carefully before fieldwork is embarked on. It is likely that more meaningful information will be gathered by more detailed longitudinal studies of a few individuals or families concerned with collection. The principal requirement will be that a basis of trust is built up between those collecting the information and those supplying it. This is particularly important in this case because many of those involved in collecting are aware that

they are operating to some extent illegally and are therefore unlikely to be willing to divulge information freely in a short space of time.

Outcome.—A picture should be built up of the role occupied by collecting wildlife in the larger social and economic life of those involved in it. From this it should be possible to try to predict the effects of actively setting up projects for the managed exploitation of wildlife in priority areas.

2.8. Study 8. A review of export market potential for different species groups.

Purpose.—To determine which components of Madagascar's wild fauna and flora offer the best potential for further development as exports and therefore the best opportunities for being incorporated into rural development programs.

Background.—Current best estimates indicate that the export trade in live animals and plants and medicinal plants from Madagascar is worth somewhat more than \$2 million per annum at export. While rates of export for some components of this trade (e.g., aquatic plants, *Catharanthus* roots) appear to be relatively stable for others, most notably live reptiles and amphibians for the exotic pet trade, the rates have been growing very rapidly in recent years. For a variety of reasons (e.g., the influence of environmental organizations on consumers in market countries, the development of artificial propagation and captive breeding in market countries) even current exports levels may not be sustainable in the long term. Before any substantial investment is made in systems of production or controlled harvest for export with a view to assisting in rural development, it is essential that the market potential for the products to be produced is analyzed.

Work to be done.—The work should be carried out to cover both sectoral and regional aspects of the international market.

The principal market sectors are these:

1. Animals

The pet trade:

Birds—Psittacines, Fodys

Mammals—*Setifer*, *Pteropus*

Reptiles and amphibians

Freshwater fishes—*Bedotia*, *Paretroplus*

Marine fishes

The butterfly house trade:

Butterflies

Other invertebrates

Decorative artifacts/Specimen collectors:

Butterflies

Other invertebrates

Leather and clothing:

Crocodile leather

Other reptile leather

Wild silk

Food

Wild honey

2. Plants

Live Ornamental Trade

Palms

Orchids

Succulents

Freshwater aquatics

Other groups with horticultural potential (begonias, helichrysums, etc.)

Medicinals

Pharmaceuticals

Herbal remedies

Genetic stock for crop improvement (e.g., *Coffea*)

Foods and spices

Aromatics

Raffia

The markets to be considered: existing major markets in Europe, North America, and Japan and potential new markets in Africa, particularly South Africa, Southeast Asia, and Australia.

Clearly a comprehensive analysis of all sectors and all market regions will be time consuming and costly. Emphasis should therefore be placed on the identification of a few key areas of high potential. Initial stages of the study should thus be intelligence-led to ensure that valuable resources are not wasted. It should also be remembered that the markets for many of these products, particularly the collector's markets for exotic pets, orchids, succulents, and specimen butterflies, are not well understood. Only a limited amount of information will be available and trends will often be difficult to elucidate.

Key factors to be addressed are these

- a. The overall size of the market and predictions for its future development over the short to medium term.
- b. Identification of possible competitors, and identification of other factors likely to affect Madagascar's potential share of the market (e.g., uniqueness of products, potential for captive breeding/artificial propagation in market countries).
- c. Requirements of the market: quantity, quality, reliability of supply, price. Analysis of Madagascar's ability to satisfy these requirements, particularly with respect to factors such as cost and reliability of transportation.
- d. Investigation of possibility of increasing value-added component to exports. (e.g., fully mounted butterfly specimens, palm plants instead of seeds, etc).
- e. Estimates of the likely return from investing in particular products.
- f. Political considerations. These are discussed in detail in the introduction to these scopes of work. Before any decision is made by international aid agencies and operators to become involved in any production system using natural products,

very careful consideration will have to be given to its possible political implications. This is likely to act as a considerable constraint on the initial choice of products for pilot projects under TRADEM.

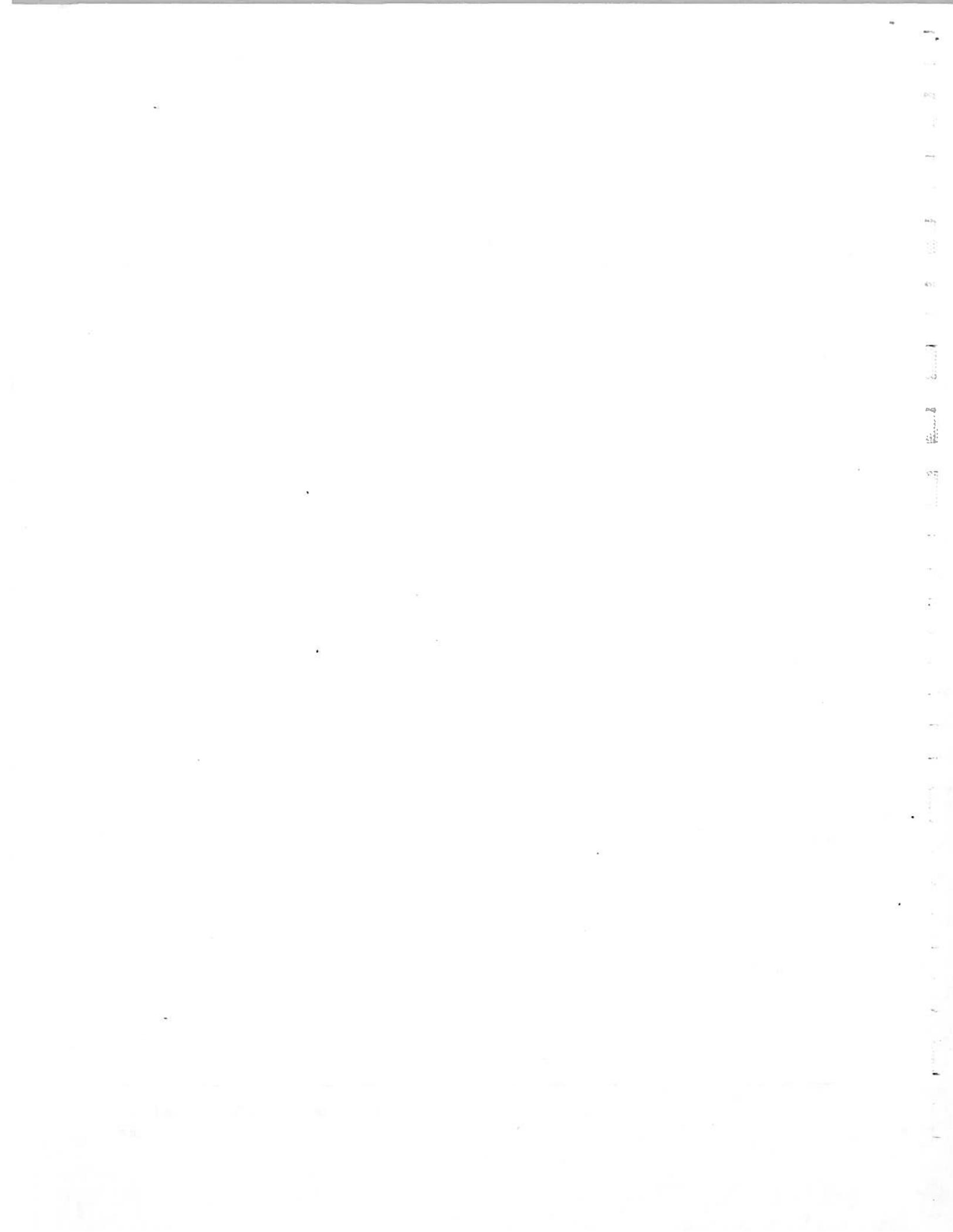
Outcome.—The identification of a series of promising markets for Malagasy natural products with an analysis of their potential and recommendations for the best means to attempt to develop them.

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Tropical Research
& Development, Inc.

7001 S.W. 24th Avenue
Gainesville, Florida 32607 • USA
Tel. (904) 331-1886
FAX (904) 331-3284
E MAIL TRD@MCI.COM