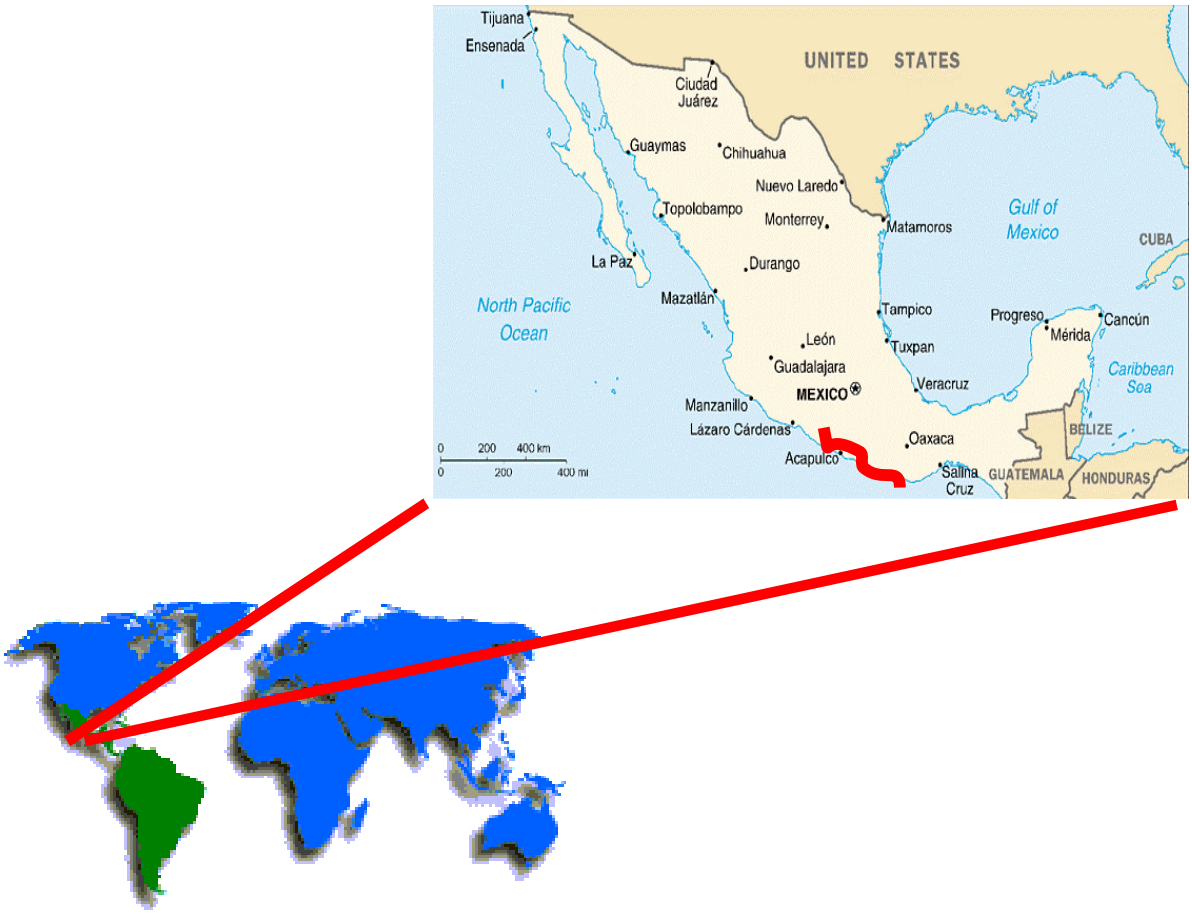
INCENTIVES TO CAMPESINOS CREATIVITY AND EXPERIMENTATION FOR THE CONSERVATION AND EFFICIENT MANAGEMENT OF BIODIVERSITY IN THE CENTER-MOUNTAIN REGION OF THE STATE OF GUERRERO



UNEP

Incentives to Peasant Creativity and Research for the Conservation and Efficient Management of Biodiversity in the Center Mountain Region of the State of Guerrero, Mexico.

INCENTIVES TO PEASANT[21] CREATIVITY AND RESEARCH FOR THE CONSERVATION AND EFFICIENT MANAGEMENT OF BIODIVERSITY IN THE CENTER-MOUNTAIN REGION OF THE STATE OF GUERRERO

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1. Summary of the Case Study

The Incentives for Peasant Creativity and Research Project is a case in which incentives are applied aimed at rewarding the creativity and capacity of peasants for finding solutions to the problems resulting from the deterioration of biodiversity and natural resources. Also to multiply actions that are oriented towards conservation of the dry forest ecosystem, in a region inhabited by indigenous peasant communities, classified as living in extreme poverty.

It is a small-scale initiative that consists of offering direct social and economic incentives to families, groups and communities who win the prizes in a contest for ideas to solve problems dealing with their natural resources. The peasants whose proposals are selected receive half of the materials and half of the money they need to put their experiments into action. Other incentives such as training, exchange workshops, public exhibits of their work and visits to other villages are aimed at recognizing the social value of their knowledge and contributions as well as at strengthening their methodological capacities to improve their experiments and their practices in the management of natural resources.

Two year's experience have shown that there is a very positive response from the peasants involved when direct economic incentives are offered as a prize to their own initiatives. Even though this case was carried out at a small scale, it can be used as a pilot from whom learning's can be drawn for incentive programs in governmental public policies.

This project is only one line of the Peasant Management of Natural Resources Program (PMCRN) which since 1993 has been seeking to develop good management practices and sustainable use of natural resources as a whole, by developing processes aimed at conscience-building, training, organization and action in the peasant communities in the short, medium and long range. This program includes a wide array of projects, and it's strategy is built on a peasant vision that considers the rationality of the communities' survival strategies within their natural and social environment (Aguilar et al, 1997).

It is an initiative that emerged from the close collaboration between two independent organizations: a regional peasant organization, the SSS Sanzekan Tinemi and the Group for Environmental Studies A.C. [22](GEA,). The former is a regional social organization with influence in more than 100 communities, which has been working for more than 15 years on development projects such as community stores and savings institutions, agricultural products supply, handicrafts marketing, productive projects for women and reforestation. The latter is a professional civil association committed to finding solutions to environmental problems with the participation of local populations. GEA has played an advisory role for Sanken Tinemi since 1992 and in that time has developed several research, planning, assessment and implementation activities (Aguilar and Zapoteco, 1997).

[21] The word "Peasant " is used to denote the unique character of the Mexican farmer. It is not the farmer in the Anglo-Saxon sense, but rather peasants who have worked the land for centuries, whether for the *hacendados* of the colonial era or as community (ejido) or small property farmers who received land after the Mexican Revolution.
[22] GEA, for its initials in Spanish.

2. Ecosystem status and identification of pressures on biological diversity

The Sanzekan Tinemi influence region includes the municipalities of Chilapa, Zitlala, Ahuacuotzingo and Mártir de Cuilapan, in a zone set between the Center and Mountain regions of the State of Guerrero.

According to the INEGI[23] Geological Map of the region it is a geologically complex area, with predominance of sedimentary rocks of the Cenozoic and Mesozoic eras. It is set in the physiographical Province of the Southern Cordillera, in the great river basin of the Balsas River, between the Tlapehuala, Atempa and Metlalcingo rivers. It has a topographic system with landforms that include complex mountain ranges, low mountain ranges, rolling hills and a few valleys. Altitudes range from 700 m above sea level at the Balsas Depression, to 2500 m at the highest regions. Chilapa is located in one of the most extensive valleys, at 1400 m above sea level. The types of soils in the region are *acrisols, chernozems, rendzines* and *vertisols*. The annual average temperature range between 20 and 22 degrees centigrade and the annual average rainfall between 700 and 1400 mm.[24]

The dominant vegetation types are dry deciduous forests that include pure oak stands, with *Quercus glaucoides, Q. magnoliifolia and Q. elliptica,* and mixed tropical deciduous forest with *Bursera spp. Lysiloma acapulcensis, Leucaena spp.,Quercus spp., Pseudosmodingium sp., Ipomoea spp. Swietenia humilis, Ceiba sp., Brahea dulcis, Agave spp.* Only a small area of *Pinus spp.* forest is found at the highest points. *Brahea dulcis* palm groves and pastures with *Bouteloa and other* grasses develop in the most deteriorated areas. Along the riverbanks are forests with *Taxodium mucronatum* and *Salix humboldtiana*.

Although there are indicators that suggest predominantly robust trees once formed oak forests over 15 meters tall, now only secondary growth of 5 to 10 meters tall is found, interspersed with scarce thin oaks. The river bank vegetation has also deteriorated as a result of a decrease in the water table level.

The peasant population, of *Nahuatl* and *Mestizo* origin, survives on the basis of a diversified use of their natural resources. They combine maize cultivation, in either animal traction or tlacolol (slash and burn) systems, with extensive cattle grazing, and the extraction of plant species for firewood, medicines, food, *mezcal* production, handicrafts and other products. Maize yields for the area are approximately 700 kg/ha. Families without land represent 35% of the total population, and 60% have less than 1 hectare (Aguilar *et al*, 1997). The families' economy depends in great measure on temporary migration to other parts of the country and abroad. According to INEGI's 1990 census the active economic population over 12 years old, represents up to 32.5% of the total population and 20 to 50% of the population is expelled every year.

The present state of the ecosystems is in great part determined by the way that these have been managed during the long history of human habitation of this region. This management combines on the one hand, the relative conservation of natural resources due to good management practices developed by the peasants over centuries of empirical knowledge. On the other, the deterioration caused by the pressure resulting from the complex socioeconomic processes in Mexican society which push the region and its inhabitants into marginality.

Among the practices that have had positive long term effects on the ecosystems are:

[23] INEGI stands for National Institute for Statistics, Geography and Information.
[24] Taken from INEGI geological map1: 1000,000; INEGI physiographic 1:1 000,000; and INEGI edaphologic map1: 250,000, 1988

- Practices that allow the regeneration of vegetation under *tlacolol* [25] cultivation: leaving tree stumps to sprout back, sparing certain useful species, and allowing fallow periods long enough for regeneration to take place (Casas, *et al,* 1994).
- Various local *in situ* management practices which have favored an increase in the density of certain useful species.(*Brahea dulcis, Leucaena spp.)* (Illsley *et al*, 1998; Casas, 1992).
- Soil conservation methods such as "tecorrales"[26] which have been important in reducing erosion in indigenous communities.
- Processes of domestication of useful plants, especially in home gardens (Casas *et al,* 1994).
- Community agreements and rules which regulate the access and use of natural resources (Illsley, Gómez, *et al,* 1999).

Some practices that have contributed to the deterioration of natural resources are**:**

- Uncrontrolled expansion of the agricultural frontier over valleys and slopes
- Extensive migratory cattle grazing of herds formed by thousands of animals, a practice that began in Colonial times and continued into this century, and whose impact has still not been accurately assessed (Quintanar. E., 1998)
- The current extensive practices of cattle raising (Quintanar, 1998; Olivier, 1998)
- The use of fire for various purposes in ecosystems that seem to have small tolerance to fire, except for some species such as *Brahea dulcis* (Illsley *et al,* 1998)
- The intensive extraction of specific non-timber forest species for commercial use (palm, *otate*, medicinal plants, *maguey*, and resins, among others) which has put great pressure on some of these resources (Aguilar *et al,* 1997)
- The extraction of firewood and building materials over a long period of time (Morales, 1999).

A study done by Landa (1992) in La Montaña communities, which are very similar to those in the region, shows that approximately 42% of the territory has deteriorated. This figure gives an idea but cannot be generalized though, as the degree of deterioration varies from one community to the next as a result of the particular history and conditions of each human settlement.

3. Incentives introduced

In broad terms there are very few government incentive programs aimed at poor indigenous peasants who rely on subsistence farming. The government's adjustment policy has reduced federal programs for technical assistance, distribution of basic goods and fertilizers, credits, etc. for rural areas in general and specifically for zones that are economically and productively marginal. The area we are concerned about is currently receiving official funds to alleviate the effects of poverty sharpened by the adjustment policies, in programs like temporary employment, reforestation and school breakfasts, among others.

Government programs that promote reforestation in certain areas on a greater scale pay salaries to peasants for their reforestation work. The problem with these programs is that they include little or no follow-up work and a great percentage of the plants die shortly after being put into the ground. Peasants feel the government is employing them and do not consider reforestation work as a

[25] Tlacolol is the name for a local form of slash and burn agriculture.
[26] Tecorral is the local name for a small stone wall, widely used for terraces.

benefit for their communities. The salary they receive is not an incentive, but a political manipulation. On the other hand reforestation is not focused on ecosystem conservation. Plantations are made without planning either the final reason for neither their existence nor the most adequate sites and species to be used. As a result of this, for example, plants such as *casuarina*, eucalyptus and pines have been introduced into dry forestlands.

On the other hand Sanzekan Tinemi has developed and applied several types of incentives that promote community participation and accountability through different tasks and projects of the Peasant Management of Natural Resources Program. Some of these incentives are specific to a project or action line, while others cut across the whole program.

It would be impossible to present all of the projects here in, so we have chosen to write about only one, the Incentives for Peasant Creativity and Research Program, which deals with incentives in the most innovative way. But before going into detail, we will list the types of incentives that are applied to the overall program:

A) General Incentives in the Natural Resources Peasant Management Program

Economic Incentives

Direct

Access to wage labor for the people in the communities. Building infrastructure in communities such as plant nurseries and soil and water conservation works.

Indirect

Wider access to markets for handicraft products made from of non-timber forest species, especially palm and *maguey.*

Social Incentives

- Technical training and strengthening of local skills in various technical, planning, discussion and management issues
- Technical assistance
- Access to positions of higher status within the communities and the regional peasant organization
- Appraisal of the indigenous community's innovations, knowledge and practices

Institutional

- Collaborating among various actors: community authorities, reforestation committees, technicians from Sanzekan and GEA, federal government agencies and their state delegations, etc.
- Promoting positive decision-making in community assemblies dealing with agreements and rules for local regulation and legislation for the access and use of natural resources.
- Considering local ways of solving conflicts within the communities.
- Periodic assessment of all activities as a way of guaranteeing the transparent use of resources.

B) Specific incentives to the Peasant Creativity and Research Program

Premises

The project itself is conceived as an incentive for the peasants. We part from the premise that peasants are permanently observing and experimenting in their every day work with different elements of their environment. Using empirical trial and error methods they face and solve problems related to the natural resources they manage. They also have a baggage of knowledge they pass on from one generation to the next. It is not a matter of falling into the myth that peasant knowledge is intrinsically ecological or that all peasants are innovative, but rather of recognizing their mechanisms for generation of knowledge, their capacity to respond to problems and the ingeniousness in some of their solutions (Hernández Xolocotzi, 1979; 1985).

We also consider that the appropriation of technology is favored when people participate in the creation and adaptation of specific proposals for a given context. Peasants will feel more responsible of their own proposals and therefore will show more care in the process of their implementation (Barrett *et al*, 1990; Abedin et al, 1991; Rhoades et al, 1991; Selener et al, 1997).

The program offers incentives for the ingeniousness and proposal capacity of the peasants based on traditional knowledge, combined with the input they receive from new technical and scientific information as well as any other elements that may give them greater potential and richness.

The contest and the awards

The project promotes a yearly contest for the best ideas proposed by peasants to solve problems related to natural resource management and which they wish to experiment in the field.

An award is given to the best proposals[27]. It consists of a sum of money equivalent to part of the cost of the experiment that is to the cost of testing their idea and putting it into practice. Winners are given part of the materials they will need, as well as a bonus equivalent to enough money to pay for one half of the salaries needed for carrying out the experiment.

The prizes include three types of incentives:

- A direct economic incentive: the amount of money for materials and wages.
- A social incentive: it is honorable to win a prize. The fact is made public and the prize is awarded in an event that draws many people by the president of Sanzekan Tinemi.
- Personal satisfaction: of being able to put into practice owns one idea.

The peasants' proposals deal with various natural resources, but the general objective is to contribute to improving the overall conditions of the ecosystem, caring for water, soils, and native vegetation.

Training course workshop: cross-fertilization exchange.

Every year a training course workshop is given with each new group of peasant winners, In these workshops, the group analyzes each of the ideas proposed. More information is given and technical suggestions are offered on how to improve each experiment. A dialogue is established between the technical and scientific information held by the technicians and the local knowledge of the peasants. Some very basic and simple concepts of formal scientific research are introduced such as "witness and repetitions" as well as ways of registering observations and monitoring changes, either in written form or in drawings. By acquiring these concepts peasants increase their capacity for observation and research without resigning to their own criteria.

[27] The judges are Sanzekan Tinemi's staff, GCA staff and two or three peasants of the communities

The social incentive here is to strengthen their own capabilities by providing them with information and some external methodology.

The exchange research workshops: exchange of ideas, follow-up and discussion.

Follow-up exchange workshops were held in one of the communities every three or four months, rotating from one village to another. The entire group of peasant researchers took part, as well as the village authorities and other local people. Teams visited the experiments in process in that village and everyone commented on their progress. The idea of these workshops is to create a space for reflection over each experiment and over what is trying to be achieved globally. It is a time for exchanging information and experiences and for sharing opinions and advice on the work of each project. The work each person has done is appraised and criticism and other forms of expression are encouraged. It is a way to follow-up and learns from each other, and also to create group quality control.

The incentives involved are basically of a social nature:

- The strengthening of the capacity to reflect on ideas, to express them and to learn different techniques
- The social recognition of the value of local and individual knowledge, awareness building of the value of their knowledge

Visiting and getting to know other communities is important, because many people, especially women, although they belong to the same region, seldom leave their villages, and visiting even a neighboring village can be a strong incentive. With the visits the program provides an indirect economic incentive by paying transportation and part of the food expenses. The host community makes the preparations for food and space and provides some local materials.

Public exhibit of results

At the end of the year a public exhibit of results is organized in the municipal capital of Chilapa. The peasant researchers prepare posters with drawings that represent their work and explain how their experiments developed. Other peasant organizations, communities, different types of institutions, students and teachers from schools at all levels and municipal authorities are invited to the exhibit. At the end, certificates are awarded to the peasant researchers in recognition of their work.

Incentives in this case are of a social nature: the regional social recognition and appreciation of the knowledge and skills of the peasant researchers and their contribution to solve environmental problems.

Peasant visits from other regions

Groups of peasants from other regions of Mexico have visited the Chilapa region and hopefully soon researchers from here will visit similar projects in other places in a peasant to peasant exchange of ideas. Over time the project has become linked to the Peasant Research Network in Mexico[28] and a group of 25 peasants and technicians from other regions of the country visited the area last year. These visits constitute an additional incentive to their work.

[28] The Peasant Research Network in Mexico is formed by different groups that work in the country: Sierra de Santa Marta Project and Community Development from the State of Veracruz, Protropico and DIP Group from the University of Yucatán ICRAF-Yucatán, Maderas del Pueblo from Oaxaca, Community Development Service (SEDAC) from Hidalgo, International Center for Maize and Wheat Research CIMMYT, and Alternatives form Puebla. The Rockefeller Foundation founds the network.

4. Requirements for the implementation of measures

In this case, a preliminary but important step was the participatory design of the Incentives to Peasant Creativity and Research proposal by the leaders of the Reforestation Area of Sanzekan Tinemi and GEA technicians. The institutional arrangement then was basically set up between the two organizations, to establish agreements on the work program and to manage the funds, which came from NAFEC.[29]

The first requirement to run the project was the creation of a small seed-capital fund of USD 10,000. Sanzekan Tinemi, who was in charge of delivering the respective awards to the peasant researchers, managed this fund.

A second requirement was to launch a wide public campaign to advertise the Contest in the 14 communities where the Reforestation Area of Sanzekan Tinemi works. Every community was visited in order to publicize the contest and promote participation. Posters were put up in public places, written and illustrated in simple language. Short messages were taped and broadcasted in each community. The contest was also announced on a local radio station. Additionally, this campaign helped to raise awareness about the problems of natural resource deterioration in the region.

The campaign invited people to submit their proposals in writing or if they did not know how to write, in a drawing that explained their idea. Many adults asked their children or someone else in the community to help them write and draw their ideas. The GEA program coordinator visited the communities over several weeks in order to help people and groups elaborate their proposals.

Another basic requirement was to find mechanisms to convince people to become seriously involved in the projects. In this case, the winners signed an agreement by which they promised to put their proposal into practice and carry it out to its completion. It was also important to talk to and involve authorities from the communities in the implementation of actions, and to encourage respect and care for the community activities.

Also required was the forming of a team of professionals or technicians as advisors. They should be sensitive to the people's language and perspectives in order to establish a fruitful dialogue, to adequately use participatory methods in which the technicians are the facilitators of the process that will help the peasants express their own ideas (González et al, 1993). They should also be able to respect and consider that many of the peasants brave enough to enter the contest are local experts and have a deep knowledge of their resources.

It was required that incentives not only be economic. The creation of spaces where peasants were the main actors helped them to express themselves and transmit their knowledge and at the same time develop their ideas by favoring discussion among themselves. This helped the appropriation not only of their work but also of the joint effort the entire team of peasant researchers was committed to.

5. Implementation process

A) Who participates in what?

The beneficiaries of the incentives have been mainly families and groups of peasants who have participated in the project in different ways:

During the design of the Peasant Creativity and Research project, communities participated only in a consultation process. The GEA coordinator visited each of the communities to talk to the

[29] North American Fund for Environmental Cooperation.

"principales"[30] the authorities and the reforestation committees, in order to listen to their suggestions on how to carry out this sort of project. The Sanzekan Tinemi leaders and the GEA technicians however, basically did the final decision-making.

By the end of the first year though, a group of peasant researchers was established and some of them had direct participation in the discussions over the project's direction and operation for the second year. Peasant researchers from each community formed groups and elected a coordinator each. The opinions these coordinators expressed about the project's operation were important in the decision-making process.

Involvement of the community authorities took place basically during the contest advertisement stage. Deeper involvement would have been desirable during the whole process, not only at the initial stage, because many actions that were selected deal with the community's wellbeing. If authorities included these activities as part of the community's responsibilities it could guarantee their long-term effect.

Citizens who participated during the exchange workshops and exhibits, either by preparing food or the grounds or simply as spectators had other degrees of involvement. Sanzekan Tinemi technicians offered transportation to the communities and GEA provided facilitators.

B) Criteria and mechanisms for selecting the proposals and awards

The proposals presented were first sorted out into two kinds: experimental and ecological actions. The proposals selected were those that showed most inventiveness, brought a benefit to the community, were low-cost, replicable by other peasants and where the proponent agreed to be responsible for making the results known not only within his/her village, but also within the region. On general, preference was given to proposals coming from groups or communities, over those from individuals. The complete list of selected proposals can be seen in table 2.

The prize amounts were not the same for all contestants. First, second and third place awards were given, according to the work time each proposal represented. First places, consisting of an annual amount of $500 Mexican pesos (USD 50) were given to those experiments that required investing several days work over the whole year. Second places, with $400 Mexican pesos (USD 40) went to experiments which required a medium amount of work inversion, and third places, with $300 pesos (USD 30) to the ones that required less work, perhaps a few days to establish the experiment and only simple monitoring over the following months.

C) Assessment

Project assessment took place at the end of the first two years of operation to analyze its successes and failures and to improve performance during the next stage. Everyone involved in the project has been interviewed: individual peasant researchers working in teams, authorities from some of the communities, Reforestation Area of Sanzekan Tinemi technicians as well as from other areas in Sanzekan, and government officials who are familiar with the project. Thanks to this evaluation, several problems were better analyzed and problems and risks involved throughout the process were identified. Some of these will be discussed later on in this paper.

6. Effects of the measures

During the two years of the program, two contests were held one each year. 114 people from 8 different communities took part. Even though some deserted, during that period an average of 50 people formed a constant group. In the first year a little less than half of the researchers were

[30] Principales are those people, generally older men and women that command respect in the community because of their experience and the services they have offered during their lifetime.

women, and by the second year they represented 55% of the group. More projects were abandoned during the first year, and when this happened it was mostly men who abandoned 16 men and 2 women. During the second year only 4 men and 1 woman abandoned the work. This was due to the fact that there was a greater awareness of the way the project operated (See table 1).

Table 1. Participation in the Peasant Research Project

	Men	%	Women	%	Total	%
First year	40	66.6	20	33.3	60	100.00
Abandoned	16	26.6	2	3.3	18	30
At the end of the year	24	40.0	18	30	42	70
Second Year	24	44.4	30	55.56	54	100.00
Abandoned	4	7.4	1	1.8	5	9.25
At the end of the year	20	37.0	29	53.7	49	90.75
Total in both years	64	56.1	50	43.85	114	100.00
Abandoned	20	17.5	3	.8	23	20.2
At the end of two years	44	38.5	47	41.2	91	79.8
Participated both years	13	11.4	11	9.6	24	21.0
Participated one year	31	27.2	36	31.5	67	58.7

A. Experiments

The proposals presented were first sorted out into two kinds experimental, aimed at trying out new practices or new ideas. Others promote practices already known, but may be adapted to specific conditions in order to improve a particular resource, such as the protection of springs or reforestation with certain species. The latter were accepted for representing good ecological practices and were called ecological actions.

Of the total of 59 experiments, 32 had to do with species propagation, 4 with improvement of the soyate palm, 10 with organic fertilizers and pesticides, 8 with soil conservation works and 5 with Spring protection (see table 2).

Table 2. Community, number, type of experiment, treatment and objectives of the peasant researchers in Guerrero, Mexico.

First year

Community	No	Type or Experiment	Treatment	Objective
Agua Zarca	14	Forestry and fruit trees	Seed sowing applying animal manure and natural soil fertilizers.	Propagation of plants for firewood and food.
Ajuatetla	2	Forestry and fruit trees	Various densities sowing and application of animal manure	Increase tree growth.
La Esperanza	1	Forestry trees	Layering and stumping	Propagation of tress for firewood
Trapiche Viejo	1	Forestry and fruit trees.	Recollecting native saplings Stumping, and seed sowing.	Propagation of trees for firewood and food
Ayahualco	1	Palm (*Brahea dulcis*)	Ditches and clearing	Increase in leaf productivity
La Esperanza	2	Palm (*B.dulcis*)	Construction of barriers (tecorrales), organic fertilizers and clearance	Increase in leaf productivity
Topiltepec	1	Palm (*B. Dulcis*)	Removing plant suckers and clearing	Increase in leaf productivity
La Esperanza	1	Maguey *(Agave spp*)	Sowing and application of organic fertilizer.	Growth improvement
Trapiche Viejo	2	Organic insecticides	Ant mound dirt, chile, garlic,	Control of large red ant and

			cempaxóchitl, damiana mixture.	other plagues
		Ecologic actions		
Ajuatetla	2	Spring	Fencing and tree sowing with the application of animal fertilizer	Care and protection
Trapiche Viejo	1	Spring	Spring improvement, construction of water troughs	Care and protection
Santa Ana	1	Water spring and reforestation with *maguey*	Fencing and tree sowing with *cypress;* sowing magueyes in neighboring terrain.	Care protection and maguey improvement.
Topiltepec	1	Retaining walls	Construction of soil retention works with live poles and ditch reed sowing	Ditch protection

Total experiments: 30

Second Year

Community	No	Type of Experiments	Treatment	Objective
Agua Zarca	16	Forestry and fruit trees	Seed sowing with the application of animal manure	Production of plants for firewood and food
Ajuatetla	1	Forestry trees	Direct sowing, production of trees and reforestation	Tree propagation and reforestation
La Esperanza	1	Forestry trees	Layering with hormones	Tree propagation
Trapiche Viejo	1	Forestry trees	Sowing red *guaje* at various densities	Firewood production
Ayahualco	1	Palm *(Brahea dulcis)*	Ditching and clearing	Increase in leaf productivity
La Esperanza	2	Palm (*Brahea dulcis)*	Construction of stone barriers (tecorrales); organic fertilizers and clearing	Increase in leaf productivity
Topiltepec	1	Palm *(Brahea dulcis)*	Removing tillers and clearing	Increase in leaf productivity
Trapiche Viejo	1	Organic insecticides	Use of chile, garlic, *cempaxóchitl, damiana*, papaya seeds and *quina* mixture;	Plague control in chile, tomato, garlic, fruit trees and flowers
		Ecologic actions		
La Providencia	2	Spring	Fencing and tree sowing	Care and protection
Trapiche Viejo	1	Spring	Clearance, water spring improvement, fencing, construction of water trough, and reforestation	Care and protection
Santa Cruz	1	Spring	Fencing and sowing of cypress, oak and other species.	Care and protection
Topiltepec	1	Retaining walls	Construction of soil retention works with live poles such as: *peperucha, tzompantle,* prickly pear with ditch reed and banana sowing	Ditch protection

Total of experiments: 29

During that time 8 training and experience exchange workshops were carried out, 4 group visits to local communities and 2 regional exhibits. Close to 500 people attended the exhibits, including students from all grades in Chilapa. Some 100 posters were made by the peasants to explain each one of the experiments and their results. Didactic materials like several cassettes and one workbook on the basic concepts of formal scientific research were produced (Quintanar et al, 1997)

Technical results

Among the main effects of the program was the fact that the peasant developed certain practices that effectively help to solve some of the main problems pertaining to natural resource management, like firewood scarceness, palm quality and soil erosion. It would be impossible to show in detail the results of all experiments in this paper, so we have chosen to highlight the most outstanding features in each general field.

Plant propagation

This was a very attractive theme: of the total of fifty-nine experiments carried out, 32 had to do with the propagation of quick growing native plant species for firewood and various domestic uses. The propagation methods included using seeds, grafting, collecting of saplings in the wild and layering. The species and methods used are detailed in table 3.Good results were obtained in:

- Direct sowing of yellow oak, avoiding the time, effort and expense of going through the nursery and with better results in plant survival
- **Effective propagation of tepeguaje through air layering, shortening the time to harvesting of firewood in future plantations**

Table 3. Species and methods used for plant propagation.
Plants propagated from seeds

Common Name	**Scientific Name**
Forest treesy	
Asocona	*Alvaradoa amorphoides*
Casuarina	*Casuarina sp*
Cubata blanca	*Acacia pennatula* (Sch. et Cham.) Bentham)
Cubata prieta	*A. cochliacantha*
Chapulistle	*Dodonaea viscosa* Jacq
Oak	*Quercus spp*
Yellow flower or nistamazúchil	*Tecoma stans*
Guaje blanco	Leucaena sp
Guaje rojo	*Leucaena esculenta* (Moc et Sesse) Benth
Guamuchil	*Pithecellobium dulce*
Maguey	*Agave spp*
Paraca o palo verde	*Senna spp*
Pie de cabra	*Bauhinia spp*
Tepeguaje	*Lysiloma acapulcensis*
Tepemezquite	*Lysiloma divaricata*
Zopilote	*Swietenia humilis*
Fruit trees	
Avocado	*Persea americana* Mill
Lime	*Citrus limetta* Risso
Sweet lemon	*Citrus auriantifoliun* (Christm.) Swingle
Mamey	*Mammea americana*
Mandarine	*Citrus nobilis* Lour
Mango	*Mangifera indica* L.
Níspero	*Eriobotrya japonica* Lind
Papaya	*Carica papaya* L
Tamarindo	*Tamarindus indicus L*

Plants propagated by cuttings

Common name	**Scientific name**

Ahuejote	*Salix humboldtiana*
Cacalozuchil	*Plumeria rubra* L. y *Plumeria acutifolia* Poir
Cacaguanantle	*Apoplanesia sp*
Plum tree	*Spondias mombin*
pito ó tzompantle	*Erythrina americana* Mill.)

Plants propagated by collecting saplings in the wild

Common Name	**Scientific Name**
Cubata blanca	*Acacia pennatula* (Sch. et Cham.) Bentham)
Cubata prieta	*A. cochliacantha*
Tepeguaje	*Lysiloma acapulcensis*
Paraca o palo verde	*Senna spp*

Plants propagated by air layering

Common Name	**Scientific Name**
Tepeguaje	*Lysiloma acapulcensis*

Soyate palm

The four experiments with the *soyate* palm (*Brahea dulcis*) tested various practices to increase production and improve the quality of leaves. Some experiments were done with the purpose of improving moisture levels and soil fertility. By building small stone barriers and ditches and using organic fertilizers. Others tested traditional palm management practices such as clearing and removing new vegetative growth (tillers).
These practices resulted in an improvement in soyate palm productivity by:

- Producing more leafs per frond
- Improving the quality of leafs: wider, longer and more resistant.

Water and soil conservation works

Building retaining walls, locally known as “retranques”, was one of the most successful ecological practices for gully protection that will be described in more detail further on. Various plants were used in building the retaining walls or barriers, such as *nopales* (*Opuntla spp*,) *peperucha, pito* or *tzompantle, yellow amate (Ficus petiolaris* HBK*), cacalozuchil, izotes (Yucca sp), casahuate (Ipomoea intropilosa) tetlatia (Pseudosmodingium multifolium*). Each barrier was planted with ditch reed *(Arundo donax L.)* and bananas (*Musa paradisiaca L.)* in order to decrease water flow, thus avoiding erosion. Useful products for domestic use were also obtained from the different plants.

Five actions to protect springs were carried out, two of which involved the construction of rustic water troughs for livestock. In these cases trees were used for reforestation, such as ahuejotes (*Salix humboldtiana*) and cypress (*Taxodium mucronatum* Ten), as well as fruit trees and other species while some were used as contour lines.

Organic fertilizers and pesticides

Two groups of 20 women decided to propagate some of the trees mentioned above as well as cilantro (*Coriandrum sativum* L), garlic (*Allium sativum* L), onion (*Allium cepa* L.), radish (Raphanus spp) and tlanipa (*Piper sanctum* (Miq Schl) applying various organic fertilizers from donkeys, mules, goats, bats, ants, ashes, mud silts. Their experiments consisted on comparing the use of the different types of fertilizer or combinations of several of them. In this case, the establishment of witnesses and replications was not clear and monitoring irregular and therefore it was not possible to draw clear conclusions.

The experiments with insecticides used ant hill rubbish as a repellent against the large red ant, and a mixture of this with *cempazuchil (Tagetes sp.),* garlic, chile, quina, and papaya seeds to fight orchard and fruit trees plagues. This experiment had similar problems to the above mentioned, yet was regarded by all as a very interesting idea

B. Social aspects

From this perspective one of the most important achievements was that the peasants became conscious of the value of their own knowledge and capacities to find solutions for problems related to their natural resources. The exchange workshops helped improve oral and written communication capacities in the transmission of ideas and experiences. This helped them to learn from and to teach other peasants, creating a feeling of belonging as researchers and of collective responsibility for the final object of the program.

The development of technical innovations was stimulated, parting from the recuperation of traditional knowledge and the appropriation of new ideas and information. In some cases, as in the palm experiments, the blending between their empirical methods and the scientific forms of monitoring and systematic register of changes was astounding.

Another important effect was that most of the women involved started to express themselves in public spaces, improving their proposal capacity and expression of ideas. Another group of women managed an experiment based on an experimental design that included several treatments, replications, witnesses, and systematic registering of results. The general idea held within the group is that the experiments carried out by the women are good because they help in food production and solving basic problems like firewood and palm.

We will give a brief account of one experience, the building of retaining walls or retranques, because it appears as an “ideal” example of the effects produced by the project.

A group of 5 researchers from one of the communities decided to stop erosion of two big gullies, reviving an old forgotten practice they had heard of from their forefathers. They worked in a team building the retention walls in one of the gullies. The effectiveness of the ancient practices was demonstrated that same year as it stood up to the heavy rains brought about by the strong rainstorms that came down that year. Excitedly, the second year they went on to protect a second gully, trying some new techniques at the same time. At the end of each year out of their own initiative, they organized the formal delivery of their work to the authorities and the whole community, with an event that ended with a festive meal with mezcal and music in the traditional indian fashion. The cost of this event was covered with the money they had received as a prize, so in essence all the work that went into building the retaining walls was voluntary. These acts represented their way of institutionalizing, within their traditions, the work that they considered a benefit for the community. It was the way they found to make the community, through its traditional institutions, appropriate the works and take on responsibility of their maintenance and seek continuity of the practices.

C. Greater Impacts

Seen in isolation, the results of this project may seem insignificant, but as part of a wider program like the Natural Resources Management Peasant Program its effects have much greater potential. If we consider that:

- soil conservation works have been built at a rate of added 5 hectares per year during the last three years in five communities,
- palm handicraft exports have increased to almost one million pesos per year,

- all the above actions involve almost 1000 people and their influence covers all the Mountain region and other regions in the state and some even reaching the national level. This influence is achieved through national and international and meetings, where GEA and Sanzekan are invited to attend. Sanzekan is also part of a national peasant organization.

A small project like this, with a very low budget but that encourages peasant creativity and initiative and has a means to be heard at local, state, national and international levels has a great potential to multiply its impact.

D. Problematical impacts requiring further discussion.

Cash incentives vs. voluntary community work.

Whether to provide cash or not as an incentive has to do in part, with an old discussion about the nature of collective benefits in peasant communities, mainly among the indigenous communities.

Free collective labor or service in the communities has for centuries been one of the institutionalized mechanisms available to carry out all necessary tasks for the benefit for the community. It is part of the obligations of all adult citizens living in the community who must contribute to live there and enjoy common services.

These traditional mechanisms of community work have been altered with the arrival of government programs that pay for specific jobs, such as building roads, dams or public buildings, or the creation of temporary rural jobs which pay salaries or day wages to people for activities such as reforestation, highway repair or building terraces. People have learned that the government pays for jobs that are normally part of the general community initiatives for maintaining a productive community

There are many cases where people in the communities have begun to demand payment for carrying out tasks that have traditionally been of service to the community. In some, it is very difficult to call on the people to take part in a collective task because they do not want to work without a salary. Many village authorities argue that waged programs alter, damage and erode the community's self-sufficiency and survival mechanisms.

On the other hand, the lack of land, low yielding productivity and the lack of employment and opportunities in the marginal peasant and indigenous regions in the country, along with the constant and increasing pressure to be incorporated into a monetary economy, turns waged labor into one of the main demands and needs of people. This explains the temporary and permanent migration rates in the Central Mountain region.

The incentives project was never conceived as an employment generator. The awards are not considered as payment for labor. Nevertheless, because of conditions of poverty, a project that offers a certain, though small amount of money, to reward a given activity, cannot help but touch on the delicate points of this discussion, whether or not they alter the traditional standards and mechanisms of collective work for the common benefit. In this respect, there have been various criticisms:

"Peasants become spoiled"

As mentioned above, the most common criticism is the fact that the peasants get used to receiving money for doing tasks that benefit the community, and afterwards they do not want to do the work otherwise. Nevertheless, the project does not pay salaries, it rewards ideas, creativity, and innovating or beneficial actions that are not usually recognized as such by the communities themselves. Biodiversity protection is something that is not understood socially as being of common

benefit, therefore valued. A reward is a way of adding value to knowledge and actions that have been ignored, and to motivate and encourage many more activities.

It has been suggested that prizes should only be in-kind, offering a list of useful materials that are needed by the community, such as wire, buckets, radios, tools, plows, etc. The people of the community however, are already incorporated into a monetary economy, and therefore have to pay not only for objects, but also for services, such as transportation, health, etc. All these are paid for with money. The fact that money is precisely what is lacking in these regions makes it a powerful incentive.

"Not everybody receives a prize"

There is also criticism of the fact that some people in the community receive prizes and others do not. This has been considered to have a negative impact on the people who do not receive money, because it creates a feeling of envy. Nevertheless, the project cannot work with the same logic as the government rural employment programs; it is not about an employment program for everybody. It is an incentive for those who are willing to devote time and creativity in an effort, which is not usually recognized. The fact that some members of the community receive a reward is what becomes an incentive to encourage more people to propose ideas or actions to become involved, to protect natural resources and biodiversity.

The long-term goal is for peasants to carry out efficient practices for biodiversity protection and natural resources management, and that society value this and hence be willing to pay for these services.

Money to "play with"

Another criticism has been that money is given so peasants can "play" to research. This idea reflects the fact that their creativity and ability to solve problems, innovate, and contribute something to society is still not valued. Why is it that while in other sectors of society, millions of pesos are spent on research and knowledge generation, it is not acceptable to spend on promoting peasant creativity, research and knowledge? Why is it that while in other sectors of society prizes are given to encourage creativity among writers, artists, or scientists, it is not yet understood that peasants are equally creative and capable of generating knowledge and proposals? Why is it that peasants are not considered worthy of receiving prizes and fellowships for devoting time to producing knowledge and actions for ecosystem care and protection, which benefit all of society?

7. Lessons learned

- Two years of work experience have shown that: There is a very positive response from peasants when direct economic incentives are offered for them to develop their own ideas regarding ecosystem care and protection
- The incentives multiply the possibilities of solving ecosystem deterioration problems and favor the appropriation of efficient natural resources management practices by peasant populations.
- Excellent results were obtained from the peasant experiments for the regeneration of multi-purpose timber and non-timber native species from the dry deciduous forest, as well as creative and economic practices for soil and water source protection that are so important for plant and animal biodiversity.
- Economic incentives should not stand alone, but be included in process involving other types of incentives that help recognize and socially value the peasant capacity to generate positive conservation and management practices.
- Peasant women respond positively to incentives as they also interact and experiment with the environment, and have the capacity to propose solutions to their most serious problems, which have an impact on biodiversity, for example, species, used for food or firewood.
- Organizing a proposal contest is a sound mechanism to identify peasant *"*experts*"* with good ideas, who should be the targets of these kinds of incentives.

- An incentive project of this kind must be included in a wider program in order to reach its potential. Other natural resources conservation and management actions should be included, as well as technical and organizational strengthening of the peasant communities involved.

Even with very small economic resources it is possible to multiply environmental and socially beneficial actions. The key is to encourage the people's capacity and initiative to generate their own responses to problems they face in their environment and provide them with external information. "A small lever can move the world". This lever can be the initiative creativity and responsability of people themselves.

8. Some proposals for a broader program for Incentives to Peasant Creativity and Research as part of public policies.

In the case of Guerrero, the institutional and management arrangement has been very simple, carried out between the peasant organization Sanzekan Tinemi, GEA and representatives from the communities. Taking into account that a program like this will be enhanced with financial support from the government or from international funds such as GEF, UNEP, UNDP, the requirements for institutional, administrative and legal arrangements may be complex. Some points that seem important include:

1. The creation of an incentive fund belonging to the communities through an independent trust or financial mechanism exclusively focused on providing incentives to the best peasant proposals for conservation and biodiversity management in a specific ecosystem.

2. The creation of an administrative council for the fund or trust mainly formed by representatives of the peasant organizations and the peasant communities involved. The council could also have representatives from an association, business or academic institution, with expertise in natural resources management, as well as municipal representation and federal representation from the SEMARNAP delegation. The council would provide general guidance for the program, establish criteria to select proposals, define mechanisms for transparent financial resources management and nominate a committee in charge of implementing and following-up the activities.

3. A team of technicians would be formed for follow-up on the work or practices proposed by the winning proposals and would organize interchange and discussion workshops using participatory methods.

4. A strategy to strengthen various actions addressed to biodiversity management and protection should involve other mechanisms to favor both biodiversity productivity and the commercialization of ecosystem products, such as handicrafts or fauna and non-timber multi-purpose species.

5. A leading principle to enrich this strategy should be "biodiversity with people," that biodiversity protection becomes a way of life for those people whose lives depend directly on it. Biodiversity is better protected when people establish conditions for its management and obtain benefits from using it, instead of merely leaving it untouched.

6. Perhaps society in general could provide economic resources to peasants who own and manage biodiversity well. Because biodiversity has a social value as well as an economic value, its proper management is a service for the whole society. It has been mentioned that a sort of "eco-peasant bonus" could be instituted, urban dwellers could purchase bonds to be paid to peasants as incentives for the environmental and cultural services they provide to society.

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