



CLIMATE CHANGE ADAPTATION: FROM THEORY TO PRACTICE IN NATURAL PROTECTED AREAS

The components of the Climate Change Strategy from Protected Areas are:

 COMPONENT: INSTITUTIONAL COORDINATION

 COMPONENT: LANDSCAPE MANAGEMENT IN CONTEXT OF CLIMATE CHANGE

 COMPONENT: KNOWLEDGE FOR DECISION MAKING

 COMPONENT: SOCIAL PARTICIPATION AND COMMUNICATION



CLIMATE CHANGE ADAPTATION: FROM THEORY TO PRACTICE IN NATURAL PROTECTED AREAS

Business training for producers' groups in
the Sierra del Abra Tanchipa Biosphere Reserve in San Luis Potosí
as a climate change adaptation measure



I. SOCIO-ENVIRONMENTAL VULNERABILITY AND NATURAL PROTECTED AREAS

There is evidence at the global, national and regional level that climate change, combined with other pressure factors, will have adverse ecological, economic and social impacts.¹ The degree to which a socio-environmental asset is susceptible to harm or damage in this context is known as vulnerability. Vulnerability is dynamic, varying as a function of temporal and spatial patterns and social factors.² Different dimensions of vulnerability can therefore be ascertained, affecting livelihoods, human welfare and adaptation (at the individual, household, collective and institutional level).³

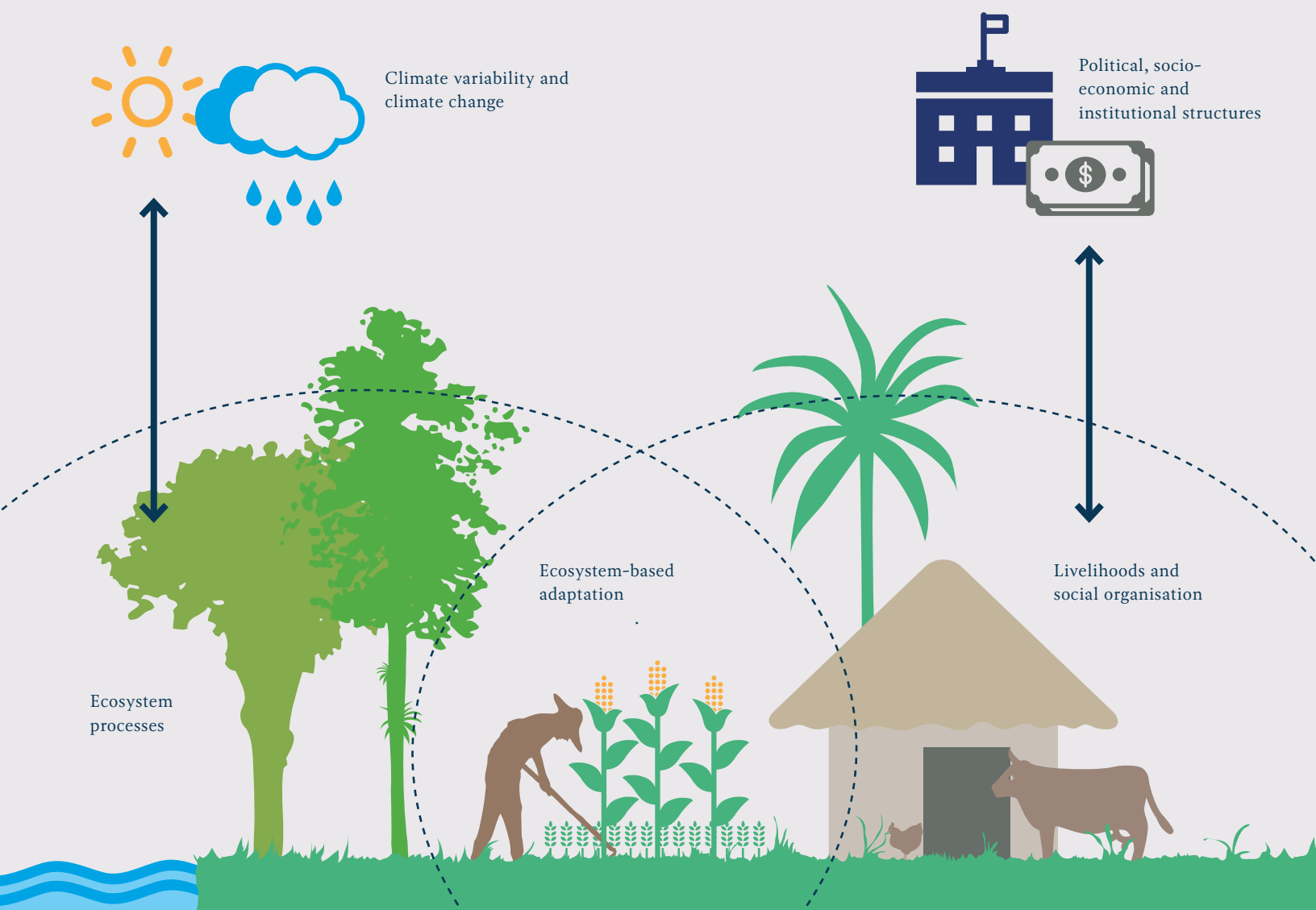
Addressing climate vulnerability involves identifying and taking account of priority ecosystems and species in conjunction with human populations and their livelihoods, which together form a socio-environmental system. In this way, adaptation and mitigation actions can be designed to cope with the impacts of climate variability and climate change in a given area and on the required scale.⁴

Mexico has made progress in developing its policy for dealing with the effects of climate change. Policy instruments include the General Climate Change Act and the Special Climate Change Programme (PECC), which serve as a basis for harmonising, coordinating and aligning government efforts with those of other actors, with a view to designing and implementing mitigation and adaptation actions. The National Commission of Natural Protected Areas (CONANP) of the Ministry of Environment and Natural Resources has developed the Climate Change Strategy for Protected Areas (ECCAP), which establishes priority areas of action for climate change adaptation and mitigation. Activities implemented by CONANP include the Climate Change Adaptation Programme for the Central Region of the Sierra Madre Oriental (PACC-RCSMO). This programme covers four natural protected areas:⁵ the Sierra del Abra Tanchipa Biosphere Reserve (San Luis Potosí), the Xilitla Priority Conservation Area (San Luis Potosí), the Cloud Forest Priority Conservation Area (Hidalgo) and the Necaxa River Basin Natural Resources Protection Area (Puebla).

< Pg. 4: Sierra del Abra Tanchipa
> Pg. 7: Family vegetable garden

On the whole, Mexico's natural protected areas (NPAs) are an effective instrument for conserving and protecting the country's natural capital.⁶ In collaboration with the people living in these areas, the NPAs enable sustainable economic activities to be carried out and ecosystem services to be provided.⁷ As the NPAs are located largely in priority conservation areas inhabited by rural communities, they can contribute towards reducing vulnerability, as a natural response to climate change.^{8,9} NPA planning and management focuses on promoting and strengthening sustainable economic activities by providing economic incentives and developing the capacities of the inhabitants to maintain and improve ecosystems and the services they provide. Effective management ensures the availability of ecosystem services, contributing to the survival, development and wellbeing of the communities. It also enables the people to adapt to climate change impacts and perturbations.¹⁰

VULNERABILITY ANALYSIS CHART







Left: Mexico, S.L.P. Right up: Los Sabinos cave. Right down: Low deciduous forest



730

Vertebrate
Species
(63% are birds)



269

Plants

II. SIERRA DEL ABRA TANCHIPA BIOSPHERE RESERVE, SAN LUIS POTOSÍ

The Sierra del Abra Tanchipa Biosphere Reserve (RBSAT) is located in the central part of the Sierra Madre Oriental mountain range in the state of San Luis Potosí. It is noted for its vegetation, including semi-deciduous forest, low deciduous forest, thorn forest and oak forest, which are home to a great diversity of species. The reserve also contains caves where little known species live. The reserve's rich flora and fauna include the elephant's foot palm or pony tail palm, the military macaw, the red-crowned parrot, the ocelot and the jaguar. There are 730 recorded vertebrate species (63% of them birds) and 269 plant and tree species.^{11,12}

The RBSAT has a beneficial effect on regional climate regulation owing to its location and vegetation, the latter affecting rainfall and temperatures. Its fractured carbonate bedrock allows water to seep into the ground, draining into the Gulf of Mexico. Furthermore, it forms a natural barrier against tropical storms and hurricanes.¹³ Its abundance of flowers is beneficial for pollination and honey production.¹⁴



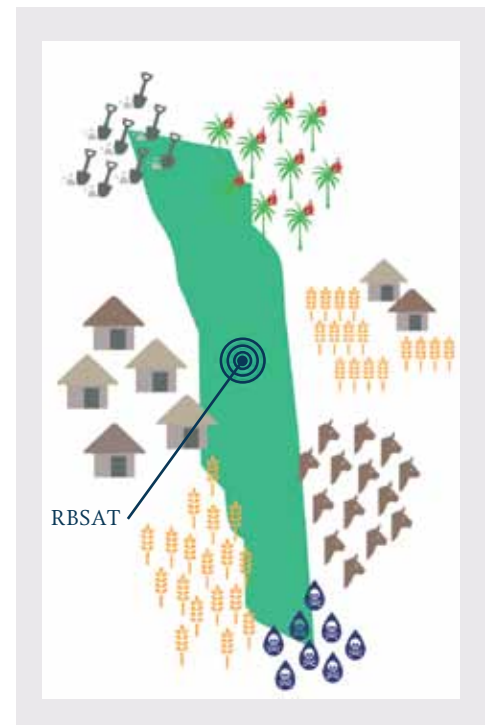
Left up: Sierra del Abra Tanchipa Left down , Cactus. Right up: butterflies. Right down: RBSAT's night sky.

In some ways, the RBSAT is like an island. Although there are no communities or economic activities within its boundaries, it is surrounded by 70,000 hectares of farmland where 28 different crops (55% sugar cane) are grown and extensive livestock activities are carried out. This poses the following threats to the RBSAT and adjacent localities:

- a. overexploitation of resources (soil, water, forests and wildlife);
- b. clearing of forest land for crop and livestock farming;
- c. use of agrochemicals (pesticides and fertilisers);
- d. poor management of water resources;
- e. crop rotation undertaken without the required technical expertise;
- f. agricultural burning.

III. ECONOMIC ACTIVITIES

People living in the area of influence of the RBSAT pursue a variety of economic activities. Over the last five years, the Biosphere Reserve staff has provided them with support, through the CONANP Conservation Pro-





Left: traditional rural construction “Bohio”. Right: Gustavo Garmendia rural community.

programme for Sustainable Development (PROCOCODES), to help them improve their practices and adopt new production models.

ACTIVITIES PURSUED BY RURAL COMMUNITIES



Aquaculture



Fishing



Livestock

- Establishment of producers’ organisations with a solid basis and experience in production and marketing
- Shift towards sustainable practices
- Markets reactivation

NEW ACTIVITIES UNDERTAKEN BY RURAL COMMUNITIES



Beekeeping



Bakery



Nursery gardening



Horticulture

- Creation of producers’ organisations
- Adoption of a gender and age-inclusive approach
- Work on the basis of sustainable production models
- Targeting of a specific market

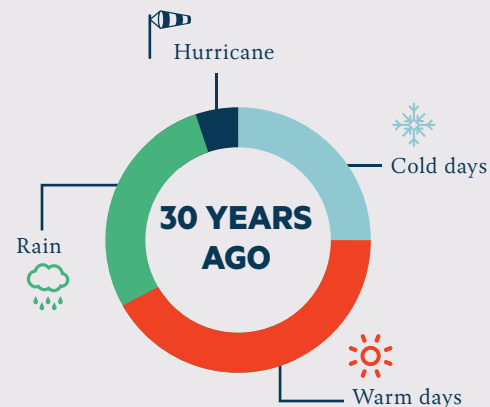
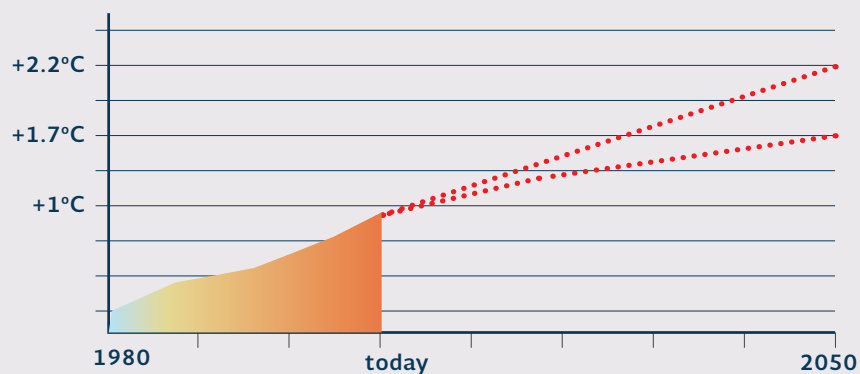
The main problems facing them are:

- Weak institutional presence;
- Lack of technical training, business advice and investment in productive infrastructure;
- Poorly organised, low-income activities, with limited access to markets, and insufficient knowledge of best practices;
- Little interest in efficient natural resource management and conservation;
- Need to increase the area of production, reduce costs and improve the production model.

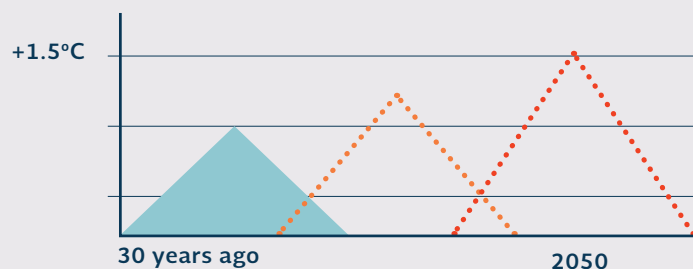
IV. CLIMATIC CONDITIONS

THE SIERRA MADRE ORIENTAL

Increase of average temperature



Increase of extreme temperature

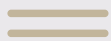


TEMPERATURE PROJECTIONS TO YEAR 2050



Over the last thirty years, climatic conditions have changed in the Sierra Madre Oriental region. The average temperature has risen by 1°C, the frequency of hot days has increased, cold days are less frequent and precipitation has declined. Projections for 2050 indicate that the average temperature will have risen by between 0.7 and 1.2° C, and extreme temperatures could rise by as much as 1.5° C. Most models predict a slight reduction in precipitation (5-10%), but stronger hurricanes.¹⁵

Regional climate change trends will result in threats to and impacts on local communities and their livelihoods, increasing their vulnerability.



Drought

Sugar cane, the most important crop in the Laguna del Mante ejido (Mexican system of land tenure that combines communal ownership with individual use), is fairly resistant to drought, but it can nevertheless succumb to severe conditions, such as those seen in 2011.

Fire

Farmers often lose control of the fires they set to burn sugar cane, putting other inhabitants, economic activities and animal and plant species in the RBSAT at risk. These fires also increase the concentration of pollutants in the air, which can cause respiratory illnesses.

Pests

The higher incidence of crop pests has an adverse effect on sugar cane and other crops.

Heavy rains

Heavy rains lead to a significant decline in lime production, causing the flowers and fruit to drop from the trees. Other commercial activities can also be affected, because heavy rains deter people from going out to shop.

Rising temperatures

Over recent decades locals have noticed a rise in temperatures and a decline in rainfall.

The scale of the impact of these conditions depends on people’s varying ability to cope, which is determined by social factors, their livelihood or sources of income (migration and remittances, farming activities, non-farming activities, etc.), access to and control of resources and conservation incentives.

Different forms of vulnerability¹⁶

1. Participation in decision-making on ecosystem use

The governance system and legal framework in place for *ejidos*, grant political power over ecosystem use to male *ejido* members only, effectively excluding other groups from decision-making and from the distribution of a substantial part of *ejido* rights and obligations.

2. Gender

The livelihoods of men and women differ significantly, with women and the household as a whole depending primarily on the earnings of men, many of whom are engaged in agriculture. This means that the women’s level of vulnerability and coping capacity depend to a large extent on the income of the husband or other members of the household.

3. Lack of conservation incentives

Payment for environmental services only benefits *ejido* members with parcels of land who participate in the Payment for Environmental Water Services (PSAH) scheme. It does not therefore help those groups most vulnerable to the effects of climate change. The payments received by households that are entitled to them do not make a significant contribution to their income.

V. NATIONAL COMMISSION OF NATURAL PROTECTED AREAS (CONANP)

CONANP is the body responsible for the country's NPAs, which are administered on the basis of a Management Programme, the planning and regulatory tool that sets out the activities, actions and guidelines for NPA management and administration.¹⁷ In the case of the RBSAT, the staff is responsible for implementing the Management Programme. It is supplemented by adaptation, mitigation and monitoring strategies identified in the PACC-RCSMO, which facilitates stakeholder coordination on a regional scale.¹⁸

Through CONANP's work, climate change issues are thus mainstreamed from the national level down to implementation in the field (Figure 1).

The RBSAT management has supported the implementation of conservation and local development processes. These include the transition of economic practices towards models that contribute to conserving local ecosystems and related ecosystem services and to strengthening livelihood options. This helps to reduce vulnerability.

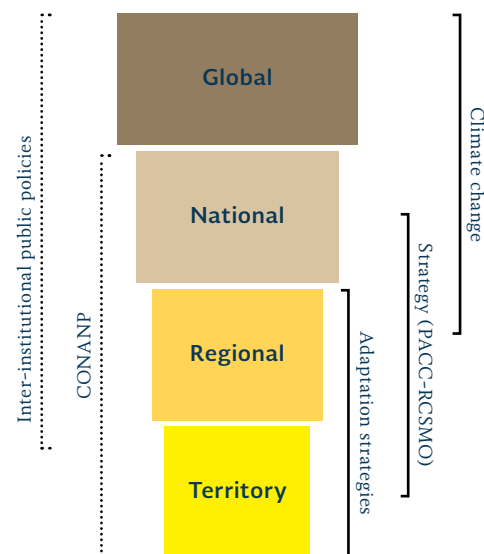


Fig. 1

VI. IMPLEMENTATION OF ADAPTATION MEASURES: THE CASE OF ABRA TANCHIPA

With a view to providing training for producers' groups, CONANP and the German organisation Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) carried out a joint economic and community assessment in 2013 as part of the Climate Change and Protected Area Management Project. They focused on producers' groups engaged in aquaculture, fishing, livestock farming, beekeeping, bread making, plant nursery activities and vegetable farming in the areas around the RBSAT. The work involved participatory workshops and interviews with producers, in addition to a market analysis and expert consultancy. As a result of this assessment, the current situation was documented and options for improvement identified, based on a review of best practices in other parts of the country.¹⁹

Training needs were identified, and the topics to be included in the technical and business parts of the training were established. A directory of potential instructors was drawn up, and a basic business training plan was designed and implemented on two levels, taking into account the organisational differences of the groups.



Fish production unit

Based on this, business training was designed for the groups and carried out. The subjects addressed were:

- options and solutions to problems;
- project management and planning tools;
- sustainable development approach;
- organisational strengthening and best practices;
- notions of public policy.

CAPACITY DEVELOPMENT FOR PRODUCERS AND ORGANISATIONAL CONSOLIDATION: CRUCIAL FACTORS IN REINFORCING THE ACTIVITIES.

CONANP, the RBSAT, GIZ and AgroDer devised a training scheme aimed at strengthening the business capability of producers' organisations operating in the area around the RBSAT.

The process involved:





Honeybee producer

THE GROUPS INVOLVED AND SOME PERSONAL BACKGROUND STORIES

Eight groups were required to prepare the business training. Each of the groups is organised in its own particular way. The personal background stories of some of their members are given below.

BEEKEEPING

Enedino

The Cuallinextli group was formed in 2011 by 16 families from the *ejidos* of León García and La Aguaje. They had been livestock farmers until changes in the use of the Reserve and livestock diseases caused a decline in this activity. Since then, the RBSAT staff has been working with them to develop monitoring and fire control activities. It has also helped them to acquire beehives and equipment and to undergo training in beekeeping.

It is a social organisation and highly vulnerable in terms of marketing and commercialisation in addition to environmental contingencies. For example, in 2013, forest fires affected the production of honey because there were fewer flowers.

The group needs organisational strengthening, capacity building and training courses in the basic concepts of business, production and marketing. Their main aim is to ensure continued operations to produce and sell packaged honey and to grow as an organisation. However, they have no plans to make investments using their own resources and will seek financing to pay for more beehives and training.

Enedino was a livestock farmer and is now president of the Cuallinextli beekeepers' group. He and the other members have undergone technical and organisational training. They market the honey they produce through an organisation with stores in the city of Querétaro. Enedino also grows corn and beans and, as a community forest guard, takes part in fire prevention and conservation activities.



Left: vegetables greenhouse. Right: native corn production.

Fabiola

Fabiola, who is thirty-three years old and a wife and mother of two, owns a family vegetable garden (72 m²) in Gustavo Garmendia. She belongs to a vegetable producers' group with 25 other members. When she was invited to join the family vegetable garden project, she was excited because she would be doing something she liked as well as supporting her family. With the vegetables she grows for the family's consumption (pumpkins, chilli peppers, tomatoes, carrots, onions and coriander), she improves her family's diet and can exchange produce with fellow members. Fabiola would like training in soil preparation, seedling germination and handling, the use of water and pest control for all the project members.

FAMILY VEGETABLE GARDENS

Twenty-five families established small backyard vegetable gardens in the *ejido* Gustavo Garmendia. However, the funding did not cover technical training and advice, and what they grow is only sufficient for their own personal consumption. The group is keen to increase the quantity and quality of their output, so that they can sell the surplus produce. Their short-term needs include organisational strengthening, technical and production advice and guidance on increasing and diversifying production.



Silvopasture group and trainers.

SILVOPASTURE

This group was set up by 12 members in the *ejido* Laguna del Mante with a view to receiving support from the Trust Funds for Rural Development (FIRA). With the Suppliers Development Programme (PDP), they are planning the installation of a storage and distribution facility, a silo and shared equipment to facilitate production. Although it is a heterogeneous group, they are all interested in changing over to a silvopasture production system and selling direct to regional packers with no intermediaries. Some of the members have past experience in production and commercial activities. In addition to livestock farming, these producers sow grain and grow sugar cane. Some are also community forest guards who work with CONANP to monitor and patrol the area. Diversification of income sources lessens pressures caused by livestock activities, which in turn reduces the use of resources in the short term. With technical support, the group is working on a land-use management plan to ensure more efficient use of their resources for each form of land-use.

Gregorio

His main economic activity is planting and harvesting sugar cane. He is also a livestock farmer and belongs to a 12-member cooperative. Gregorio has 60 head of cattle and is seeking technical, financial and commercial support from different institutions. Together with his fellow cooperative members, he is identifying innovative production and market models. He regards the silvopasture production system as a means of making better use of resources and, above all, as an adaptation measure to cope with the increased frequency and intensity of droughts.

RECOMMENDATIONS AND NEXT STEPS

Reducing the vulnerability of producers' groups contributes to biodiversity conservation and also supports local development. Strengthening groups by enhancing their organisational and technical capacities (improving processes or innovating) is therefore a climate change adaptation measure. Furthermore, if the items produced by the groups are geared to the market and based on production models that are compatible with land use, it will be possible to revive the local economy.

With this in mind, it is recommended that a programme be implemented as a socio-environmental, production-related adaptation measure to assist producers' groups, focusing on three areas of action:

1. capacity building;
2. adoption of sustainable models;
3. institutional mainstreaming. These strategic areas of action have specific mechanisms and objectives (Figure 2).

In the case of organisational development for groups operating in the proximity of the RBSAT, the following steps are proposed (Figure 3):

1. local capacity building;
2. expansion of production and area;
3. institutional coordination; and
4. project management.

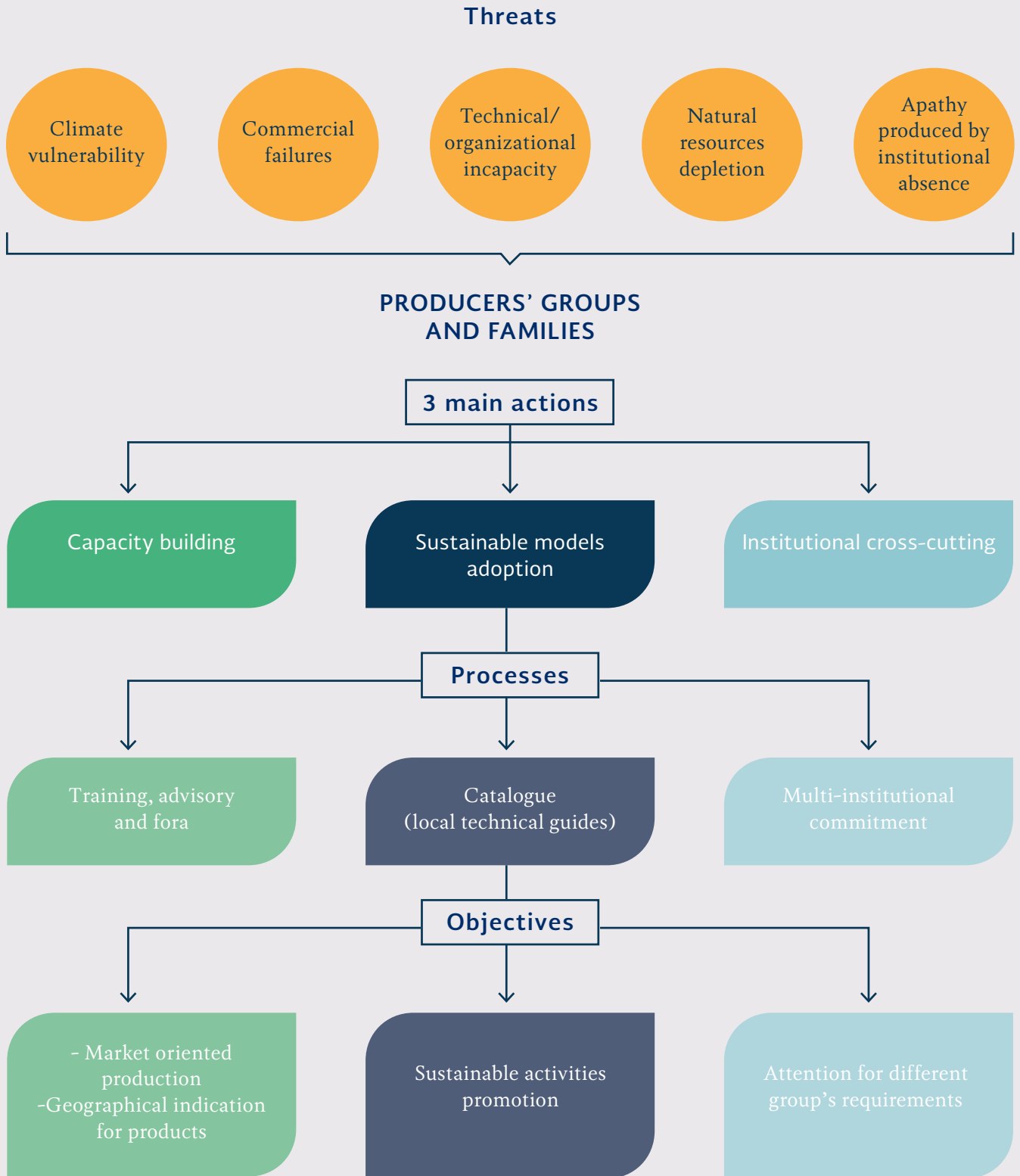


Fig. 2



Fig. 3

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