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## BASE LINE ASSESSMENT AND COUNTRY LANDSCAPE STRATEGY OF COMDEKS PROGRAM TO THE SATOYAMA INITIATIVE IN JESÚS MARÍA RIVER BASIN

# - FINAL REPORT -



APRIL, 2014

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## **ACRONYMS**

ADI	Integral Development Association (ADI, in Spanish)
ASADA	Aqueduct Association Administrator (ASADA, in Spanish)
CAC	Cantonal Agricultural Center
CADETI	National Advisory Commission on Land Degradation (CADETI, in Spanish)
CATIE	Tropical Agricultural Research Center (CATIE, in Spanish)
CBD	Convention on Biological Diversity
COMDEKS	Community Development and Knowledge Management for the Satoyama Initiative
CONAREFI	National Commission on Phylogenetic Resources (CONAREFI, in Spanish)
COP	Conference of the Parties to the Climate Change
CSA	Certificate for Environmental Services (CSA, in Spanish)
EAP	Economically Active Population
FONAFIFO	National Forestry Financing Fund (FONAFIFO, in Spanish)
ICE	Costa Rican Electricity Institute (ICE, in Spanish)
IDER	Instituto de Desarrollo Rural (INDER, in Spanish)
IDH	Human Development Index (IDH, in Spanish)
IMN	National Meteorological Institute (IMN, in Spanish)
INBio	National Biodiversity Institute (InBio, in Spanish)
INCOFER	Costa Rican Railways Institute (INCOFER, in Spanish)
INDER	Institute of Rural Development (INDER; in Spanish)
MAG	Ministry of Agriculture and Livestock (MAG, in Spanish)
MEP	Ministry of Public Education (MEP, in Spanish)
MINAE	Ministry of Environment and Energy (MINAE, in Spanish)
PAN	National Action Plan (PAN, in Spanish)
PES	Payment for Environmental Services
SAF	Agroforestry Systems (SAF, in Spanish)
SEDER	Society for Rural Development Studies (SEDER, in Spanish)
SENARA	National Water Service, Irrigation and Drainage (SENARA, in Spanish)
SEPL	Socio Ecological Productive Landscapes
SGP-UNDP/GEF	Small Grants Program of the United Nations Program for Development and the Global Environment Fund
SINAC	National System of Conservation Areas (SINAC, in Spanish)
UNCCD	United Nations Convention to Combat Desertification Land
WPA	Wildlife Protected Area

## EXECUTIVE SUMMARY

The Small Grants Programme (SGP) of UNDP/GEF launched the project "Community Development and Knowledge Management for the Satoyama Initiative" (COMDEKS) in collaboration with the Ministry of Environment of Japan, the Secretariat of the Convention on Biological Diversity and the University of United Nations in June 2011. COMDEKS has been designed to support the local community to maintain and reconstruct socio-ecological and seascapes, productive landscapes to collect and disseminate knowledge and experiences in the field for reproduction and improvement elsewhere world.

The project will be implemented in Costa Rica and will focus on supporting and coordinating specific level of community-based actions by financing small-scale projects run by local communities within the proposed priority landscapes to achieve landscape-scale impacts in developing countries.

The SGP has supported the National Advisory Commission on Land Degradation (CADETI). The committee defined a National Action Programme (NAP, PAN in Spanish) which identified the nine most degraded watersheds in the country; being the Jesús María River one of the worst cases in the Central Pacific, therefore they prioritized a pilot intervention addressing the degradation and providing inputs to replicate in other basins.

The Jesús María River Basin area is 352.8 km<sup>2</sup> and consists of several sub basins as Paires, Jesús María, Machuca, and Surubres, designed in its upper reaches in a complex dendritic pattern, high topographic profile, elongated shapes or rectangular and having origin in the mountains or Fila Monte del Aguacate. The fifth is the Cuarros River sub basin, short in length which rises in the flat lands of Coyolar. The basin is conformed by 14 districts of the counties of San Ramón, San Mateo, Esparza, Orotina and Garabito, having the cantons of San Mateo and Esparza the most area within the basin. The Social Development Index (SDI) is in a situation from moderate to high in all cantons with land in the basin.

The justification for rating this basin within the Satoyama Initiative, as to be the subject of a conservation and development initiative increasing the capacity of resilience, is focused on the high degradation and the ancient deforestation of forests. They also took into account, ecological problems like the high fragmentation of the landscape, the vulnerability of the WPA Protection Zone Tivives, the sedimentation and silting of Puerto Caldera, the improving of the living conditions of the population, the strengthening of agricultural cultures of coffee and fruit growing and the poor agro-biodiversity and the biodiversity, in general.

Basinwide, society has very good levels of organization through the CACs, ADIs, ASADAS, churches, sports committees, cooperatives and various groups of producers. Social relationships are intense among the inhabitants of the lower basin with the middle basin, but little known to the inhabitants of the upper basin. The level of social capital across the basin is very good and can undertake various projects with success. Social Capital is very high, including

factors such as trust between organizations and leaders, institutional capacity and coordination, education, technological expertise and farming culture.

For the baseline assessment and the strategy landscape for COMDEKS Program in Costa Rica, three workshops were carried out corresponding to the lower, the middle and the upper basin of the Jesús María River. All the organizations directly linked to local landscape management were invited. The Socio-Ecological Production Landscape (SEPL) approach was applied and the main results are:

<b>AVERAGES</b>	Ecosystems Protection and the maintenance of biodiversity	Agricultural biodiversity	Knowledge, learning and innovation	Social equity and infrastructure	Overall rating
Lower basin	2.61	2.32	2.70	3.35	2.75
Middle basin	3.66	2.92	3.11	3.84	3.38
Upper basin	3.01	2.86	3.47	4.01	3.34
<b>BASIN ASSESSMENT</b>	3.09	2.70	3.09	3.74	3.16

A fourth workshop was held for the organizations to plan and design Landscape Strategy for Jesús María Basin. The following objectives were defined:

### **Strategic Objective**

Develop productive and sustainable local activities to strengthen the most resilient landscapes in order to improve the resilience of the most degraded landscapes.

### **Specific Objectives**

1. To increase recovery capacity of the basin against natural phenomena and climate change.
2. To improve connectivity between different forest covers and diverse ecosystems.
3. To establish integral and sustainable agricultural production schemes in the socio-ecological landscapes.
4. To enhance the access to traditional and scientific knowledge about agrobiodiversity among the entire population.
5. To strengthen governance and effective landscape management through the organizations and institutions, interested in increasing the resilience within the basin.

COMDEKS Landscape Strategy to Jesús María River will have both, a general following and a particular one by the funded project. The local office of SGP-UNDP will be in charge of this work, in collaboration with local organizations



committed with the project. There will be two types of evaluation, an external by SATOYAMA consultants and an internal one, through local organizations.

The project will generate knowledge, practices, methods and management systems and socio-ecological landscapes in Jesús María River Basin for the purpose of replication, development and integration of initiatives in the other eight basins identified by CADETI as the most degraded in Costa Rica. It will collect and analyze information obtained from community projects and other sources, to identify best practices and knowledge for dissemination to other communities, programs, organizations and institutions. This exchange of information and knowledge will be a valuable contribution to policy formulation at national and regional level.

Satoyama Landscape Strategy in Jesús María River Basin reflects the commitment of Costa Rica under the United Nations Convention to combat desertification (UNCCD). It creates adapted methodologies to our context, in order to strengthen those landscapes; showing good resilience and restoration or retrieving the landscapes with greater land degradation and low potential to respond to extreme events of climate change. The strategy is based on using funds to leverage sustainable productive activities locally; to strengthen the institutional capacity of organizations and increase knowledge of producers and the society inhabiting the basin to achieve a development in harmony with nature.



# 1. INTRODUCTION

The SGP-UNDP/GEF launched the project "Community Development and Knowledge Management for the Satoyama Initiative" (COMDEKS) in collaboration with the Ministry of Environment of Japan, the Secretariat of the Convention on Biological Diversity and the University of United Nations in June 2011. Currently implemented in over twenty countries, the project is funded by the Japan Fund for Biodiversity and is implemented through the Small Grants Programme by UNDP/GEF. Costa Rica is one of the countries participating in this global pilot program, along with Bhutan, Brazil, Cambodia, Cameroon, El Salvador, Ecuador, Ethiopia, Fiji, Ghana, India, Indonesia, Kirskistan, Mongolia, Malawi, Namibia, Nepal, Niger, Slovakia and Turkey.

The Community Development and Knowledge Management (COMDEKS) Project of the *Satoyama* Initiative is designed to support the local community to maintain and reconstruct socio-ecological production landscapes and seascapes, and to gather and disseminate knowledge and practical experiences to replicate and improve in other parts of the world. The overall objective is to improve the resilience of socio-ecological production landscapes and seascapes through conscious management development, conservation of biodiversity and promoting sustainable livelihoods. It is expected that the COMDEKS contribution generates important lessons about best community practices towards achieving "*societies in harmony with nature*", according to Satoyama Initiative vision.

The Satoyama Initiative was officially adopted as part of the Convention on Biological Diversity (CDB) during COP10 in October 2010. It has the following principles:

1. Consolidating wisdom on securing diverse ecosystem services and values.
2. Integrating traditional ecological knowledge and modern science to promote innovations.
3. Exploring new forms of co-management systems or evolving frameworks of "common" goods while respecting traditional communal land management.

It is based on the following five precepts:

1. Resource use within the carrying capacity and resilience of the environment.
2. Cyclic use of natural resources.
3. Recognition of the value and importance of local traditions and cultures.
4. Multi-stakeholder participation and collaboration.
5. Contributions to local socio-economies.



Source: SATOYAMA Initiative. 2013.

The purpose of Satoyama is to promote appropriate socio-ecological production systems in these areas, or wherever else is needed to protect or regenerate biodiversity conservation, meeting the socioeconomic needs of resident communities and providing methods for sustainable use of natural resources.

The project will be implemented in Costa Rica and will focus on supporting and coordinating specific level of community-based actions by financing small-scale projects run by local communities within the priority landscapes to achieve landscape-scale impacts in developing countries. The project will review, analyze and encode the results of these actions on the ground to obtain and disseminate the lessons to replicate in other parts of the world.

## 2. PRIORITY AREA FOR INITIATIVE SATOYAMA

### 2.1 Identification of landscape in Jesús María River Basin

The Small Grants Programme (SGP) of UNDP/GEF has supported the National Advisory Commission on Land Degradation (CADETI). The committee defined a National Action Programme (NAP, PAN in Spanish) which identified the nine most degraded watersheds in the country, being the Jesús María River an important case in the Central Pacific region; therefore it was decided to give priority to a pilot intervention plan that addresses their degradation and provide inputs to replicate it in other basins.



CADETI has carried out scientific and technical studies showing high biophysical vulnerability of the basin to extreme natural events.

## **2.2 Description of socio Landscape and Ecological**

Until 1750, this region was one of the most inhabited by indigenous huetares and was the political center of the Chiefdom Garabito at the time of the Spanish conquest, now there are only archaeological remains and there are no indigenous people in this basin. Today, Jesús María district was Santa Catalina of Garabito, an Indian village in colonial times. In the middle and lower basin, the first colonial country ranches were settled, as Coyoche, Torrecilla, Landecho, Ramada, Coyolar, Oricuajo and El Jocote. There were also gold mines in Oricuajo (Labrador), Macacona (in operation until 1990), La Mina (Poza Azul Ranch in Jesús María), La Constancia (Alto de Cambronero), Berlin, Tres Hermanos, La Libertad and Sacra Familia (Cerros del Aguacate). The first official port of Costa Rica was located at Jesús María river mouth, called Puerto Landecho. Undoubtedly, Jesús María is one of the first basins to be colonized by the Spaniards, along with the neighboring basins Barranca and Tarcoles. The three rated as the most degraded by CADETI (2004). For almost 400 years the use of the most important and widespread land has been for pasture for beef cattle, always made by Hispanic ranchers, which remains the population living in the basin.

The culture of the people of the middle and upper basin remains as a peasant matrix ("meseteña" -white Creoles of Hispanic origin), very close by endogamic kinship. This cultural matrix, from Iberian origin, is based on a coffee, horticulture, livestock and sugarcane agroecosystem. They keep many festive and religious traditions associated with agricultural activities as the Day of San Juan (horse racing), Day of San Isidro Labrador (blessing of crops), Day of St. Francis of Assisi (blessing of animals), bullfights, cattle and drover parades, horseback riding, cattle auctions, corn fairs and patron saints day.

In the cities of Orotina Esparza (lower basin) residents live an intense transition from a rural to an urban culture. The majority of employment is in the service sector of Greater Puntarenas, the nearest main city. The cultural background is diverse and could be classified as "mestizos", product of a mix between Indigenous, African descent and Sephardic Hispanics, since the colonial times

It is important to clarify that in this basin there are no indigenous population or indigenous territories, community lands or traditional authorities. The tenure of the land is in private ownership and his control is exclusively in the hands of their owners.

There are very few areas with forest and they are part of private farms; although the Forestry Law prohibits them from making changes in land use or its deforestation. In the regime of private property the owner is absolute and must only respect the limits imposed by the State as no deforestation, respect the vegetation in the river banks, not contamination, not affectation to water sources or the subsoil (belonging to the State).

Local governments or municipalities of the basin's cantons, only relate to such properties as to charge the land tax. They are also in charge of the regulatory or land use plans, but so far those plans have not been approved.

### **2.2.1 Ecological Description**

The Jesús María River Basin area is 352.8 km<sup>2</sup> and consists of several sub-basins as: Paires, Jesús María, Surubres and Machuca; they are designed in its upper basin in a complex dendritic pattern, high topographic profile, elongated or rectangular, originated in the chain Monte del Aguacate. The fifth sub-basin is the Cuarros River. It is short in length and originated in the flat lands of Coyolar, Orotina. The main springs are located between 1,000 and 1,440 meters at the hills Constanca, Pelón, Berlín and Aguacate. At the end, the first four rivers meet between 80 and 120 meters above sea level, in the flat lands of the Labrador. The entire basin drains into the Pacific Ocean in the wetland Tivives (a Wildlife Protected Area-WPA), with its mangrove and estuarine system where Cuarros River drains directly. Tivives is a wetland of great importance because retains in good shape various mangrove species (including *Rhizophora mangle*), has vegetation typical of South and North America, is a breeding ground for marine life of extreme importance for artisanal fisheries in the Gulf of Nicoya, traps sediment transported by the river from the highlands and regulates the entry of seawater. There is also an important marine reef.

The annual average temperature is 24.8 degrees celsius and the average rainfall, 2,780 mm per year. In the sub-basin Jesús María, the highest recorded levels of rainfall exceeds the 4,000 mm per year (IMN-MINAET-UNDP: 2011). In this place is where Paires Jesús, Salto and Agua Agria rivers are born. The flow of water is 17.28 m<sup>3</sup>/second (IMN-MINAET: 2009). The basin has 81.5% of relief between 0 and 440 meters above sea level, can be qualified as flat and undulating, only the upper area has greater slopes. In the upper basin soils are inceptisols and ultisols, located in high relief slope and are exposed to rainfall between 3,000 and 4,000 mm per year. In most of the middle and lower basin, soils are alfisols highly weathered and with a moderate fertility and moisture.

The forest covers are composed of heavily managed and fragmented secondary forests, teak plantations, gallery forests, shaded coffee, fruit trees and mangroves, approximately 30% of the total basin area. Pastures with grasses, scattered trees and thickets have an approximate area of 40% (CATIE: 2011), the other 30% are urban areas, barren land of rivers, bodies of water and intensive agriculture with melon plantations. There are no natural or primary forests throughout the watershed, except about 150 hectares of mangrove forest at the mouth of the Jesús María River.

Throughout the basin, the current landscape is highly fragmented with a poor connectivity of existing secondary forests. There are small fragments in the headwaters of Surubres River and the Salto River, then fragmented gallery forest in the Jesús María River and the Machuca River; and in the river mouth there are mangrove forests (WPA: Zona Protectora Tivives). There are also some small private forests taken care by their owners as Higuito and La Quinta. In general, forests have a very altered structure and composition (secondary

forest) which have been subjected to continuous deforestation and forest fires for hundreds of years.

## 2.2.2 Social Description

The basin occupies 14 districts of the counties of San Ramon, San Mateo, Esparza, Orotina and Garabito, with the cantons of San Mateo and Esparza having the most area within the basin. All cantons with land in the basin are evaluated from moderate to high, according to the Social Development Index (SDI, IDS in Spanish). In other words, this is not a poor society in Jesús María River Basin, is a medium-developed society.

### **Social Development Index (SDI) of the five cantons with area at Jesús María River Basin**

<b>CANTON</b>	<b>IDS (100 is the highest)</b>	<b>POSITION (In 81 counties)</b>
San Mateo	63.2	27
San Ramón	60.8	31
Esparza	59.0	37
Orotina	53.7	44
Garabito	46.1	51

Source: Ministry of Social Planning and Economic Policy of Costa Rica. 2013.

There are not main cities, the population is relatively low. In different literature sources, there is not an agreement on population size within the basin, possibly because there are several counties and districts that are located outside the basin, with unclear boundaries. According to our estimate, the population is approximately 17,000 to 20,000 inhabitants. It is a sparse population in small towns like Jesús María, Rio Jesús, Berlin, Llano Brenes, Desmonte, Desamparados, Higuito, San Juan de Dios, San Mateo (the most populous), Labrador, Paires, Barón, San Rafael, Llanada del Cacao, Maratón (Guadalupe), Coyolar, Ceiba, Cascajal, La Piedra, Alto de las Mesas and Tivives. The nearest cities -but outside of the basin- are San Ramón, Esparza and Orotina and relatively near is Puntarenas, a tourist port of great importance.

The road system consists of three first-order national routes: Route 27 or Highway Caldera, the Inter-American and the oldest in the country that joins Atenas with Esparza (Aguacate route or Desmonte). It is also crossed by the old INCOFER railway line, now disused for freight cars, but in use for tourism from Orotina to Caldera. There is a possibility that in a few years the main international airport in Costa Rica will be built, in the lower basin. The transport time between any of these small communities to the City of San José is calculated in about an hour or an hour and a half, it is quite close to the capital. Almost at the edge of the lower basin is Puerto Caldera, the main one on the Pacific Costa Rican coast.

It is noteworthy that the first national road in the colonial time was the “*Camino de las Mulas*” coming out of Caldera and crossed from west to east Jesús María

basin, until the Central Valley (almost the same current path that Desmonte or Aguacate Route).

Social infrastructure and services are of very good quality and access. There is an excellent electricity coverage (around 98%), drinking water, fixed and mobile telephony and Internet. Access to preventive and curative health is good. Also access to state and private education is good. Only in the center of the basin, between 400 and 600 m, is where social and communications infrastructure services are poor; possibly due to the little population, there is little power to procure and address these deficiencies. This people have a tendency to migrate to the main population centers where the services are excellent.

In the basin overall poverty is not visible. There are not precarious settlements nor land invasions. People are not rich but live decently and are not vulnerable to natural phenomena. The ability of community and state response to this phenomenon is rapid and effective.

### 2.2.3 Economic Description

The 352.8 Km<sup>2</sup> of the Rio Jesús María, are divided into three topographic sections: the upper basin, between 440 and 1440 meters, which area is equivalent to 19% of the total; the middle basin, between 220 and 440 meters, with an area representing the 24% and the lower basin, which extends from 0 to 220 meters, which has an area of 57%, this being the larger and inhabited area.

**High Basin:** The main productive activities are the production of coffee, pastures for livestock breeding on a small scale and the secondary activities are corn cultivation, vegetables and ornamental plants. Approximately 3,000 hectares of forest shade coffee are located there, some farms in better lands with volcanic soils and other, in degraded soils, being more susceptible to landslides. In the sector of Jesús River there is a major development of large farms of chickens, pigs and dairy cattle. As mentioned, in the past, this area was a major focus of gold mining stock. In general, the land tenure is in small coffee farms between 2 and 5 hectares in the hands of about 500 farm families. It is the closest area to the Central Valley and San Jose Capital.

**Middle basin:** Characterized by extensions of jaragua pastures for extensive cattle breeding in large farms, palms and trees in pastures, forest fragments in the central area (Cerro Surubres), river gallery forests, and about 4,000 hectares of sugarcane and fruit such as mango, avocado, *sapotaceas* and to a lesser extent, citrus, nances, cashews and tamarind in the transept between Desamparados of San Mateo and Nances of Esparza (band between 200 and 300 m around the road axis San Mateo -Esparza). In the sub-basin Paires there are a significant development of chickens and pigs farms. The tenure is mostly in the hands of large farmers who don't live in the basin (absentee landlords), the farms are very large for the size of the basin (approximately 150 to 200 hectares).

**Lower Basin:** It is occupied by intensive cucurbits plantations (melon and watermelon), sugar cane, rice, papaya, pepper and tomato (usually all irrigated), improved pasture for dairy and beef cattle, forest plantations and fruit

trees. There are also industrial plants of all kinds around the road axis of Route 27, between Ceiba and Salinas. The city of San Mateo and part of the city of Orotina are in this lower basin, there are also various real estate developments of summer houses on lands that had been part of a previous agrarian reform. In the lower basin there are large livestock farms and agro-industrial production in a system of private ownership in large estates coexisting with old plots of the agrarian reform process.

Basinwide tenure of the land is in private ownership, no communal lands. In State assets there are only small holdings of public buildings (schools, clinics, etc.), the courses of rivers and the wetland Tivives. Since 1973 there are not a census of land ownership, therefore it is uncertainty today the farm size. But by field observation and discussions with various stakeholders we could say that: land tenancy in the upper basin is in small property, in the middle basin is in medium and large property and in the lower basin is large cattle properties. The old CEE-NA/82-12 Project (1982-1989) for an Agrarian Reform and Rural Development<sup>1</sup> affected 10 large livestock farms (I Salinas, Salinas II, Alto de las Mesas, Lagunillas, Cuarros, Jesús María, Surubres, Labrador, Baron and Paires) with an approximate 8.000 hectares with 500 families benefitted. The State gave titling rights to settlers, later on a sell process start oriented to recreational farms of absentee landlords from the Central Valley.

## **2.3 Justification for Landscape Selection**

Jesús María basin has been selected within the Satoyama Initiative based on its high degradation and long deforestation of their forests. Also it has been considered due to other ecological problems like high fragmentation of the landscape, the vulnerability of the WPA Protection Zone Tivives, sedimentation and silting of Puerto Caldera, the poor agro-biodiversity and biodiversity; and other socioeconomic factors such as improving the living conditions of the population, strengthening of agricultural cultures of coffee growing and fruit production.

It is true that the basin is having some problems of erosion and soil degradation, agricultural biodiversity, biodiversity of flora and fauna, of scarcity water in the dry season, forest fires and economic sustainability of farming. But at the same time, there is a resident population with sufficient social capital to devise measures of resilience and landscape recovery. There is good attitude and aptitude for cultural change and climate adaptation processes. The actual high organizational level has to be taken to the excellence as a strategy to respond and adapt to climate change.

Within the basin is possible to implement the Satoyama Initiative. There are all the good organizational, institutional, social, political, cultural and infrastructural conditions to achieve great success in the conceptual and operational framework of Satoyama. Polyculture coffee growing in the upper basin, fruit growing in the middle basin and silvopastoral productive livestock are three

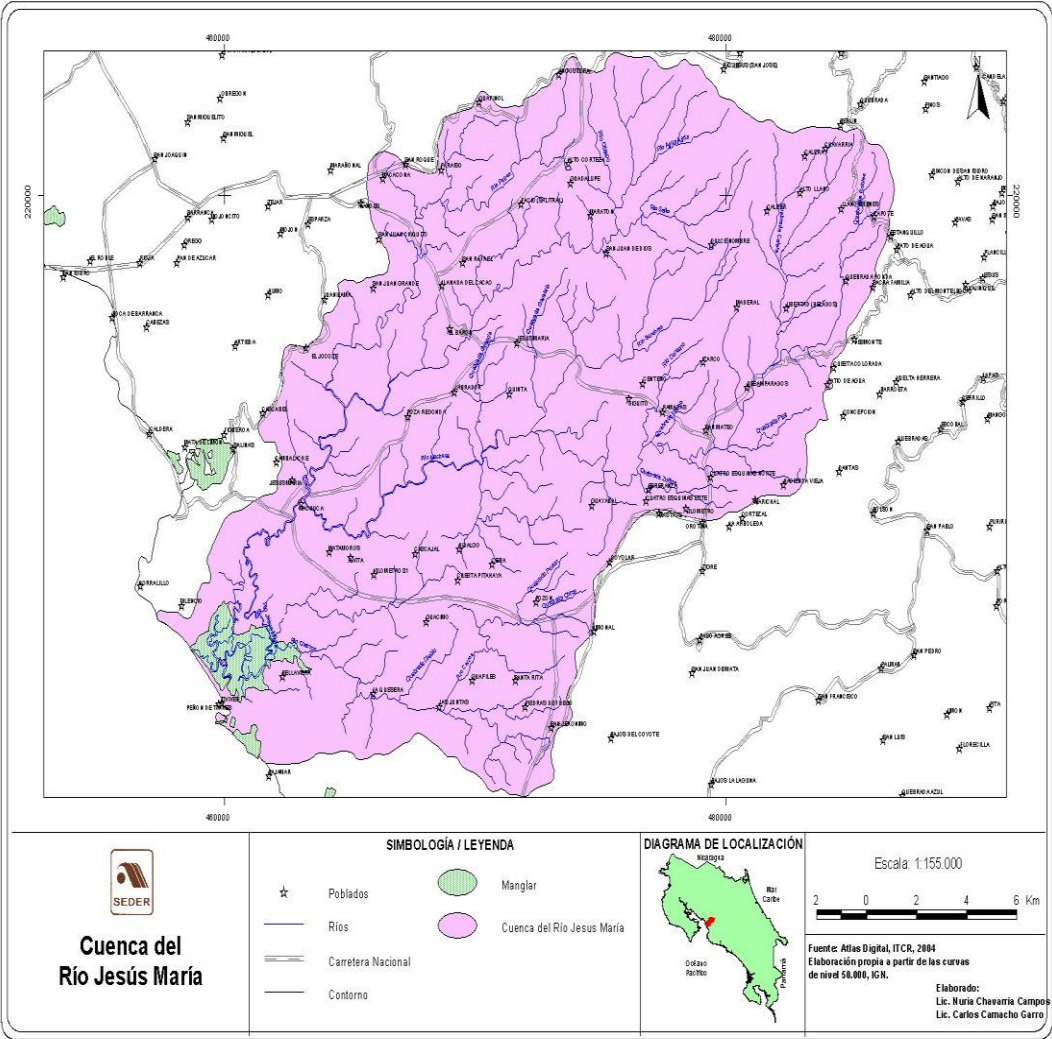
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<sup>1</sup> Carlos Borge, the leader of this Baseline Assessment and Landscape Strategy was (1984 to 1988) the Social Officer in charge of the project area CEE-NA/82-12 and Nils Solorzano, advisor for this work, was the Regional Director of the Ministry of Agriculture in the Central Pacific.



ideal productive and socio-ecological landscapes to work within this initiative. There are also opportunities to work on the restoration of the mangrove ecosystem and the estuaries ecosystem (interstitial waters sweet-salty).

MAP OF JESÚS MARÍA RIVER BASIN



### 3. SITUATION ANALYSIS

#### 3.1 Protection of Ecosystems and Biodiversity

The upper basin is occupied by small plantations of coffee, as a whole it could be classified as polyculture coffee landscape conformed by small farm families. It is a complex ecosystem where coffee, *musaceas*, forest trees, citrus, poultry and less diverse fauna are cohabiting collaboratively. Most of the coffee plantations are in shade or agroforestry systems with other crops that generate savings for the family (home-consumption) or revenues, such is the case of the *musaceas*, citrus, *jocotes*, *itabo*, *chayote*, fruit trees, timber trees or dendroenergy trees. Coffee plantations have good forest cover and generally, they are well attended. Clearly there is a culture of ancient, rooted and widespread coffee among the population. While having serious problems with fungal rust disease and low international coffee prices, they have resilience and are willing to adapt to technological change to survive as small farmers. It is also a very organized community. It is very important landscape to be worked on strengthening with Satoyama vision.

The middle basin is flat and undulating, latisoles soils and moderate rainfall, much lower than in the upper basin. Between 300 and 400 masl, land use is extensive livestock on natural pastures and *jaragua*, with little forest cover but with trees such as palms in those grazing lands. It is a very rocky area and subjected to forest and grassland fires systematically (form of management of *jaragua* seedlings). The roads here are few and very poorly designed. In this area the erosion processes are active. Livestock farms are large and sometimes with absentee owners; it is an unpopulated area. This livestock landscape is ideal for recovering forest and working on silvopastoral systems in which trees have a greater role.

In the same middle basin, between 200 and 300 masl, there are significant areas of flat valleys and very good soil fertility in San Mateo, Higuito, Jesús María, Labrador, San Rafael and Barón. In the recent past they were used extensively in horticulture (sweet pepper and tomato), as well as grains; later on, land use changed to plantations of fruit trees as mango, avocado, cashew and various *sapotáceas*, as well as sugarcane and improved pastures for intensive livestock. Erosion is less obvious; being flat lands, it is possible that sediments are trapped *in situ*. The most important ecological landscape is fruit growing as mango, avocado, *nance*, cashew, *zapote* and *caimitos*, all commercially harvested. It also coexists with birds of all kinds and some small mammals. The interest for the Satoyama Initiative would be its forest cover and high level of carbon sequestration (CATIE: 2011).

The lower basin between 0 and 200 masl is flat, latisoles soils. Land use in the lower part is in intensive commercial plantations of cucurbits, papaya, rice and sugar cane with high use of agrochemicals, there are also common improved pastures for intensive livestock. Producers have eliminated riverine or riparian forest cover to plant up to the river banks. When rapidly raises the level of rivers and there are not riparian forest cover, the mechanical river changes and large floods occur.

In Salinas and Tivives land inshore, wetlands and mangroves have dried and the own forest cover of the estuaries and inlets (interstitial waters) has been removed. The mangrove area is probably less than 50 years. It is possible that when the highest tides in October and convective rains of that month meet the interstitial waters rise to the old railway bridge and overflow the crop fields, salting them.

With climate change the water may raise more and the phenomenon of soil salinization will be higher. In this area there are active processes of soil erosion on the banks of river, mangrove sedimentation, sediment clogging at the mouth, flooding, changes in the river mechanics (courses are meandering) and soil salinization. The most prominent ecological systems are estuaries and mangroves at the Jesús María mouth. Here the work within the Satoyama Initiative could be with the mangrove and river banks, as well as promote silvopastoral livestock.

### **3.2 Key Challenges for Landscape**

Jesús María River, with its sub-basins Paires, Jesús María, Surubres and Machuca, is a rectangular basin that induces runoff rains come together quickly in major collectors, especially in times of equatorial convective rains of September and October. It affects a greater capacity of erosion and sediment transport. The Cuarros sub-basin, south of the above, has a less elongated, shape, it is flat and therefore is less susceptible to erosion.

In the upper basin the topography between 400 and 1400 m slope is very high and this accelerates the movement of runoff and erosion production and sediment transport. In this part of the basin, design is a very complex dendritic pattern and rivers originate in volcanic formations of the Upper Tertiary. It is an area with high natural potential for soil erosion and here the theme of vegetation cover becomes a key issue.

In the upper and middle basin there is a very poor design of public and private roads with steep slopes without vegetation cover, earrings lousily worked, improper venting water, path without engineering, terrace cuts producing gullies, surface weighted to constantly washed out and little maintenance. All this increases the erosive processes. Hypothetically we raise the possibility that sediment reaching water bodies come more from these bad paths and natural erosive activities than from farming. There are already initiatives underway, by CADETI, to work on correcting the designs of rural roads. This is another key to lowering soil erosion and sedimentation of mangroves and estuaries at the mouth of the Jesús María River.

The inhabitants of the basin are intensive commercial producers of crops like coffee, rice, sugar cane, fruit, cucurbits (melon, watermelon, *pipián* and pumpkins) and beef cattle. Corn and beans growers and traditional farmers for home-consumption are fewer each year. Agrobiodiversity of former integral systems has rapidly been lost and some native or traditional cultivars of maize, beans, mangoes, avocados, cashews, rice, papayas, coffee, cucurbits, peppers and others are gone. Food security is not a concern for the majority of farmers,

most of them concentrated in agricultural exports and high income. Recover lost agrobiodiversity is also key to increasing resilience.

The resident population of the basin is relatively low and the population directly dependent on natural resources much lower. The EAP works primarily in the service sector, outside the basin, in the surrounding cities like San Ramon, Orotina, Esparza and especially in the Gran Puntarenas. Some parts of the middle and upper basin have lost population and are now abandoned villages. That is, the natural resources of the basin are not being stretched to their limit. There is a chance for the resilience of ecosystems.

The entire basin has lost its natural forest cover. Possibly only small relicts of forest remain in the galleries of the main rivers and mangroves. The remaining forest cover are secondary forests, heavily managed, located in the upper reaches of the hills, relict of highly fragmented secondary forest, shade coffee, fruit trees and reforestation with teak. Possibly the flora and fauna are very poor in diversity and uniqueness. Retrieve secondary forests and establish connectivity between them is a key issue. It also becomes essential to maintain and increase forest cover from the banks of rivers and especially the system of mangroves in the mouth of Jesús María River.

### 3.3 Main Stakeholders

Basinwide, this community has very good levels of organization through the CACs, ADIs, ASADAS, churches, sports committees, cooperatives and various groups of producers. Social relationships are intense among the inhabitants of the lower basin with the media, but little known to the inhabitants of the upper basin. The level of social capital across the basin is very good and can undertake various projects with success. Capital factors such as trust between organizations and leaders, institutional capacity, institutional coordination, education, technological expertise and farming culture are very high.

The Stakeholders for this project are:

STAKEHOLDER	RELATIONSHIP WITH COMDEKS
Ministry of Agriculture and Livestock (MAG in Spanish)	Promotes agriculture export, subsistence and soil conservation. They have been partners in this initiative.
Ministry of Environment and Energy (MINAE in Spanish)	Promotes conservation, management of protected areas and works against pollution. They have been partners in this initiative.
Integral Development Associations (ADIs)	They are well-established organizations working in community development. They have been partners in this initiative.
Aqueduct Associations (ASADA)	Protect their water sources and manage their water aqueducts. They have been partners in this initiative.
Producers Associations	Join the professional interests of farmers, sugarcane growers, fruit growers, coffee producers, horticulturists and others. They

	have been partners in this initiative.
Municipalities of the five counties	Related with our interests, they are responsible for collecting municipal taxes of farms and to promote regulatory plans (none adopted).
National Forestry Financing Fund (FONAFIFO in Spanish)	It is responsible for the Program Payment for Environmental Services (PES).
Cantonal Agricultural Center of the five cantons	Support to producers through its stores for supplies and other services. They have been partners in this initiative.
Ecologists Associations	There is an active one directly related to the Protected Area Tivives.
Agriculture Research and Education (CATIE)	Performed a biophysical study on the basin and has conducted research in the watershed with livestock and agroforestry systems.
National Commission Advisory on Land Degradation (CADETI in Spanish)	It is the national coordinating body of the pilot work for the restoration of Jesús María River Basin. They have been partners in this initiative.
Rural Development Institute (INDER in Spanish)	Institution in charge of the distribution of land in Costa Rica.
National Water Service (SENARA in Spanish)	It is responsible for installing irrigation systems and farm water permits. They have been partners in this initiative.

All state institutions have a strong presence in the basin and many of its officials are natives and residents of the watershed or nearby cities. There are hospitals, clinics and universities within the limits of the basin. They also have regional offices of institutions as Ministry of Education, the Ministry of Health, the Ministry of Agriculture and Livestock, the INDER. The institutional network of the State in the basin are strong and with a good level of coordination. This increases the social capital of the entire region.

There are various external institutional actors planning to do actions for the recovery and restoration of the basin, but they are working separately. Organizations such as the Centro Cantonal de Esparza (Cantonal Agricultural Center) have expressed concern about it and have requested for more coordination of external entities to the basin.

The Ministry of Environment and Energy (MINAE) is related to the owners of the properties in regard to the prohibition of change of land use, logging permits for domestic use, reports of contamination, concessions of water sources, Payments for Environmental Services in the few remaining secondary forests. The Ministry of Agriculture and Livestock (MAG) is also related to those owners encouraging export agriculture and the major and minor livestock. Both institutions are allied with this COMDEKS project and also coordinate with the SGP-UNDP/GEF a set of small projects by donation.



The ASADAS, CACs, the ADIs and producer associations have played an important role in planning the project COMDEKS. Since the beginning they are committed with the work and have had very good relations for years with the MAG, the SGP-UNDP/GEF and MINAET. Their primary interests are water preservation for aqueducts, the PES for Forest Protection, agricultural products and agrochemicals merchandising, the development of communal works and political management.

## **4. RESULTS OF BASELINE ASSESSMENT**

### **4.1 Methodology**

Three workshops were held for the baseline assessment and Country Strategy Landscape for COMDEKS Program in Costa Rica for Jesús María basin: Low-basin (January 22, 2014 in Esparza), middle basin (January 28, 2014 in San Mateo) and upper basin (February 4th, 2014 in Llano Brenes-San Ramón).

The workshops initiated with an explanation about Satoyama Initiative, its vision, objectives, approach and principles and also a brief summary were presented in the working folders about the initiative. Addressed how this initiative is inserted into the work that has been done in the basin by SGP-UNDP/GEF in partnership with MAG and MINAE, under CADETI coordination.

A video with an overview of the area encompassing the Jesús María basin were presented to the participants, some of them didn't had clear the area within the basin. The corresponding narration about the geographical, physical and socioeconomic contextualization accompanied the video. In addition they were given an overview of the basin for a posterior reading.

The instrument designed by the Satoyama Initiative for the baseline assessment was applied. It is a survey method of summary evaluations (or Likert Scale) of five levels, twenty questions, evaluated through four categories:

- Ecosystems Protection and the maintenance of biodiversity
- Agricultural biodiversity
- Knowledge, learning and innovation
- Social equity and infrastructure

A total of 105 leaders attended the workshops: members, residents and landowners. All were invited based on their relevance as social actors. 90 instruments were considered valid; the others were removed at the time of the tabulation for not being complete or by some participants who withdrew before completing the exercise.

At the end of each workshop, the results were given back and a general discussion was held. Participants exposed their ideas about development and conservation actions to change the current state to a more sustainable state, and therefore more resilience.

The workshops were held in locations that qualified for a good job and a good attention. The application of the instrument was passed easily after the first two questions. There were no comprehension problems because the literacy level is very high. Among all participants, there was only one illiterate person, who received help from his son.

In addition a final workshop was held (February 13, 2014 in San Mateo) with 40 representatives of the three sub-basins, to return the results of the instrument applied in the previous three workshops (baseline). From the proposed actions given by participants in the three previous diagnostic workshops, the facilitator team worked on a draft strategy landscape, gathering the shares under the categories worked in the Satoyama Initiative. In this workshop a draft is presented and validated as follows: five groups are formed to discuss, added, transformed or eliminated actions, also they must prioritize the most relevant. Then each group presented their work in a plenary session, where others enrich the proposals with their contributions.

The results of the exercises in each of the workshops are presented in the following pages. Also, a general analysis and Landscape Management Strategy are addressed.



**CUENCA BAJA RÍO JESÚS MARÍA**



**CUENCA MEDIA RÍO JESÚS MARÍA**



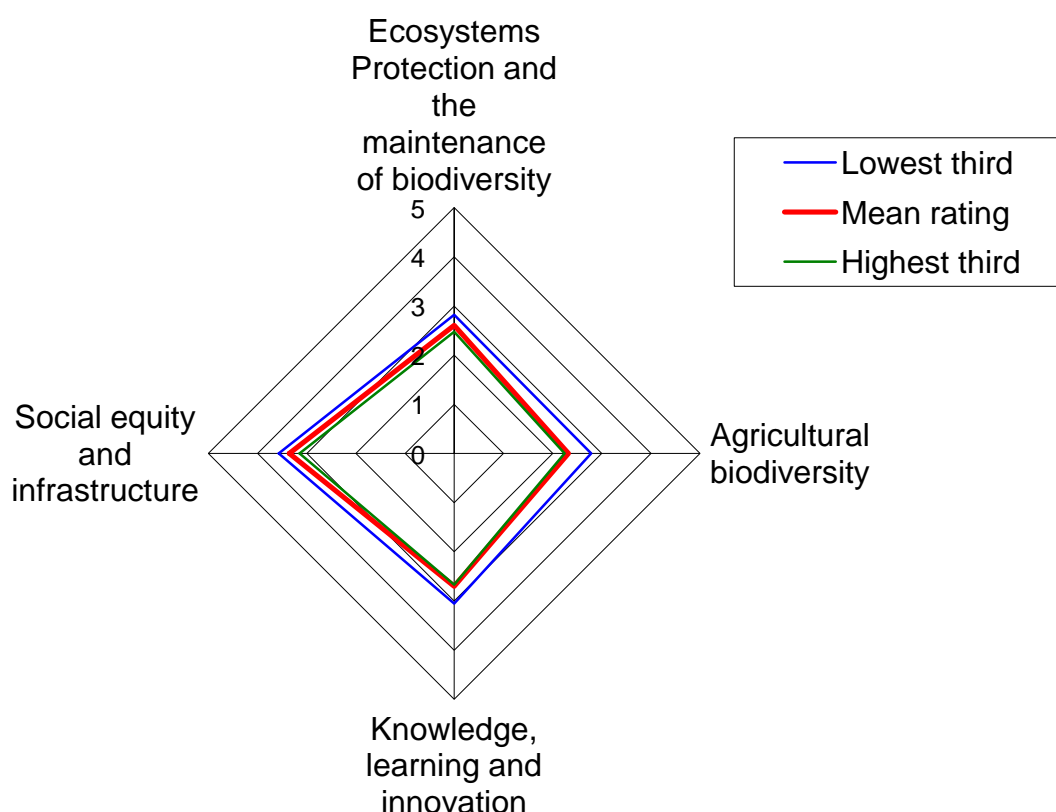
**CUENCA ALTA RÍO JESÚS MARÍA**

## 4.2 Lower Basin Workshop

Agricultural biodiversity was the category that received the lowest score: 2.32; while social equity and infrastructure is the category with the highest rating: 3.35. The other two categories are between these two ranges, with 2.61 for ecosystems protection and the maintenance of biodiversity, and 2.7 for the category of knowledge, learning and innovation.

In general, one can say that the inhabitants/users in the lower basin of the Jesús María River perceived their socio productive and ecological situation, in the categories evaluated, as good; with an overall score of 2.75. The dispersion of the data relative to the overall average is 0.69.

	Ecosystems Protection and the maintenance of biodiversity	Agricultural biodiversity	Knowledge, learning and innovation	Social equity and infrastructure	Overall rating
Lowest third	2.82	2.79	3.05	3.57	3.06
Mean rating	2.61	2.32	2.70	3.35	2.75
Highest third	2.48	2.24	2.67	3.15	2.63
Standard Deviation	0.76	0.63	0.72	0.64	0.69





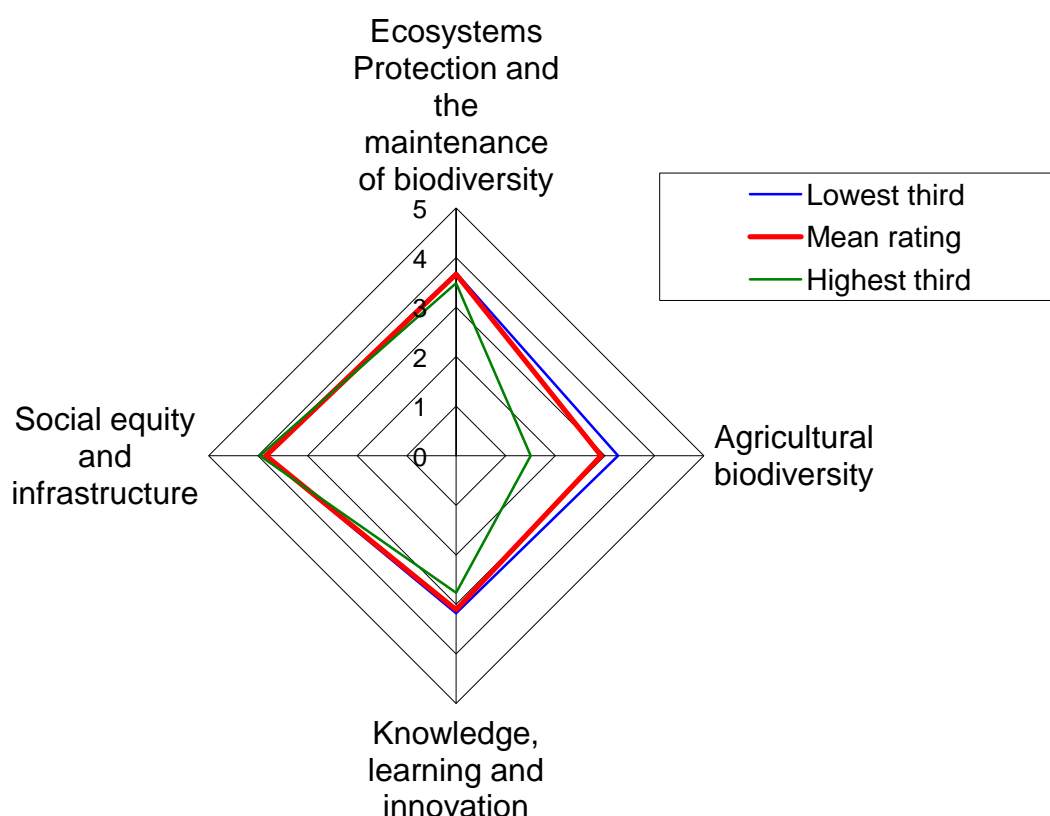


### 4.3 Middle Basin Workshop

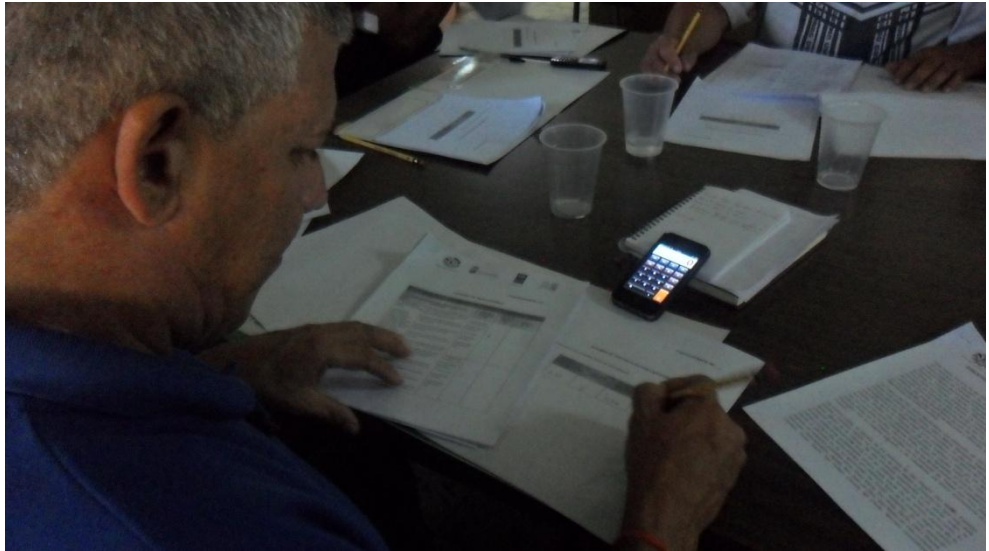
As in the previous workshop, agricultural biodiversity was the category that received the lowest score: 2.92. Social equity and infrastructure are the categories with the highest rating: 3.84. The other two categories are between these two ranges, with 3.66 for ecosystems protection and the maintenance of biodiversity, and 3.11 for the category of knowledge, learning and innovation.

The overall assessment is 3.38, better than the lower basin, the average rating was 2.75. The degree of dispersion of the data is in this case 0.69.

	Ecosystems Protection and the maintenance of biodiversity	Agricultural biodiversity	Knowledge, learning and innovation	Social equity and infrastructure	Overall rating
Lowest third	3.69	3.26	3.18	3.84	3.49
Mean rating	3.66	2.92	3.11	3.84	3.38
Highest third	3.48	1.50	2.77	3.97	2.93
Standard Deviation	0.59	1.15	0.61	0.42	0.69





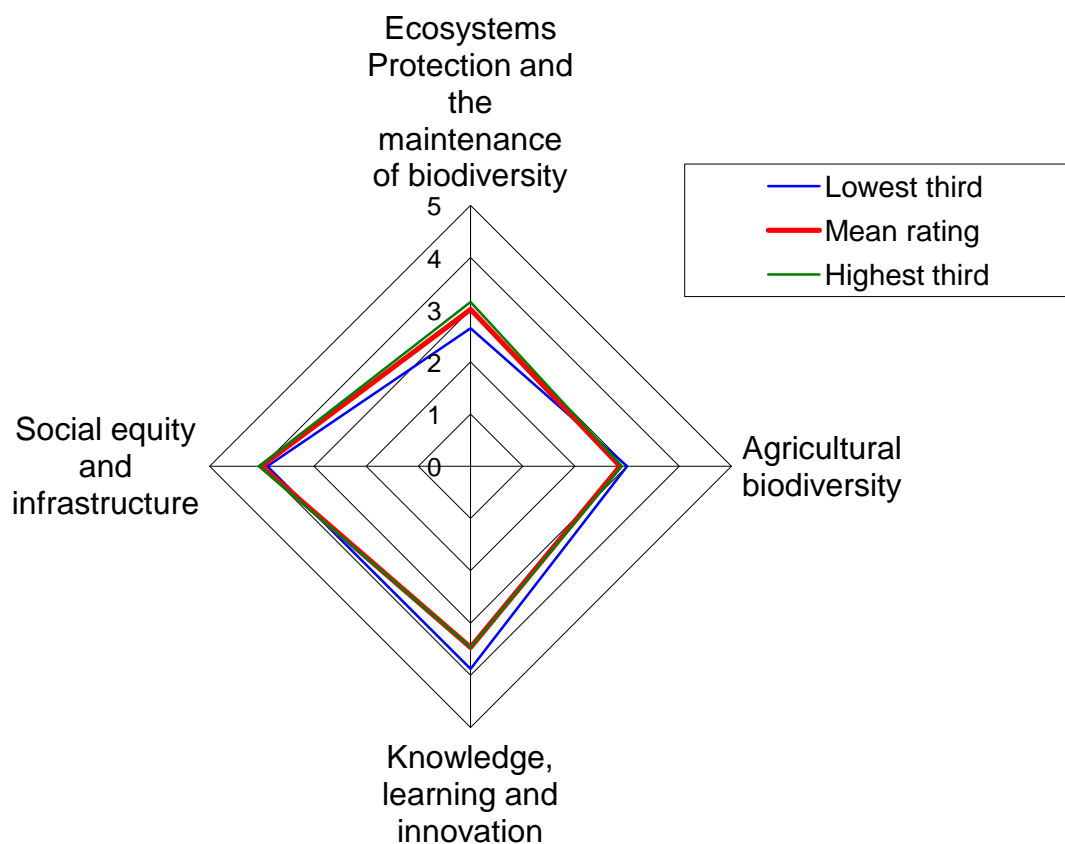


## 4.4 Workshop Upper Basin

Once again, the agricultural biodiversity was the category with the lowest rating: 2.86 and social equity and infrastructure, with the highest rating: 4.01. Similarly, the other two categories vary from those ranges: ecosystems and the maintenance of biodiversity earned a score of 3.01 and 3.47 for knowledge, learning and innovation.

The overall assessment is 3.34 and the overall standard deviation is only slightly higher than the previous two cases 0.71.

	Ecosystems Protection and the maintenance of biodiversity	Agricultural biodiversity	Knowledge, learning and innovation	Social equity and infrastructure	Overall rating
Lowest third	2.64	3.00	3.88	3.89	3.36
Mean rating	3.01	2.86	3.47	4.01	3.34
Highest third	3.15	2.90	3.47	4.05	3.39
Standard Deviation	0.58	0.96	0.81	0.49	0.71

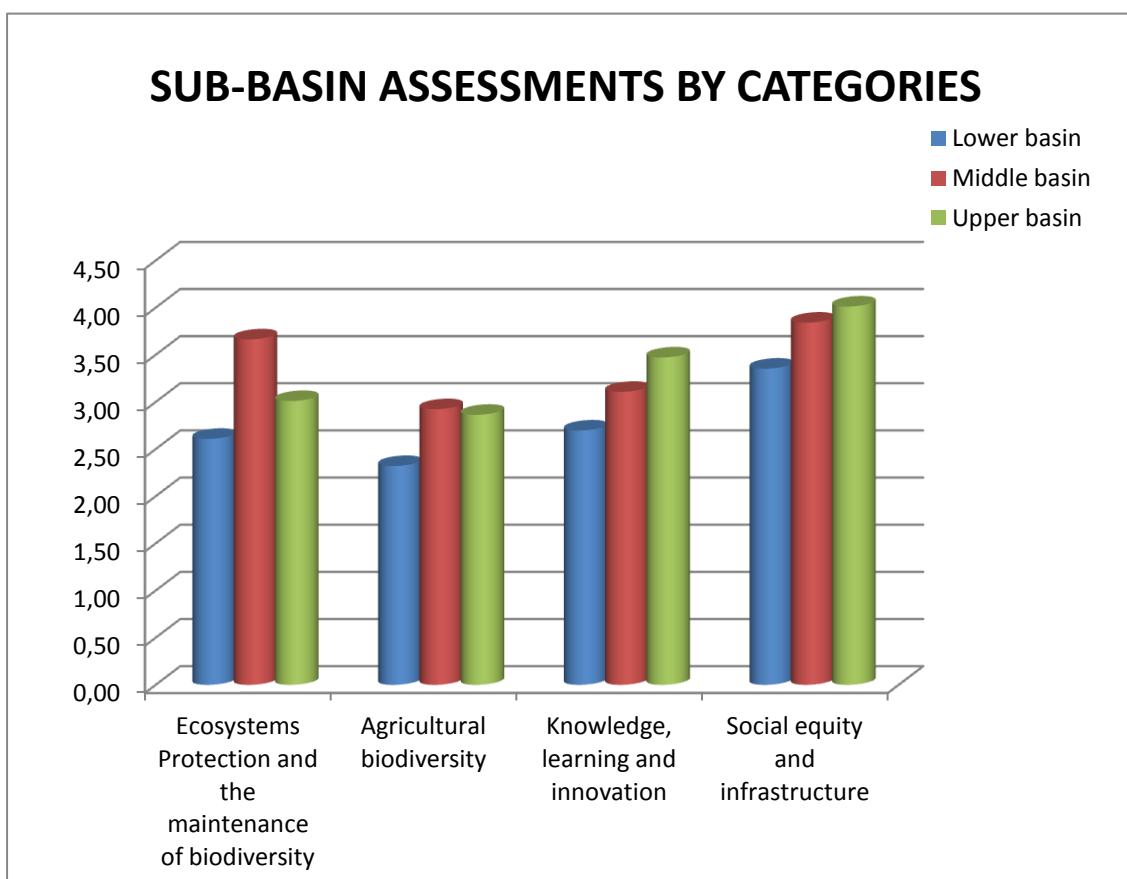




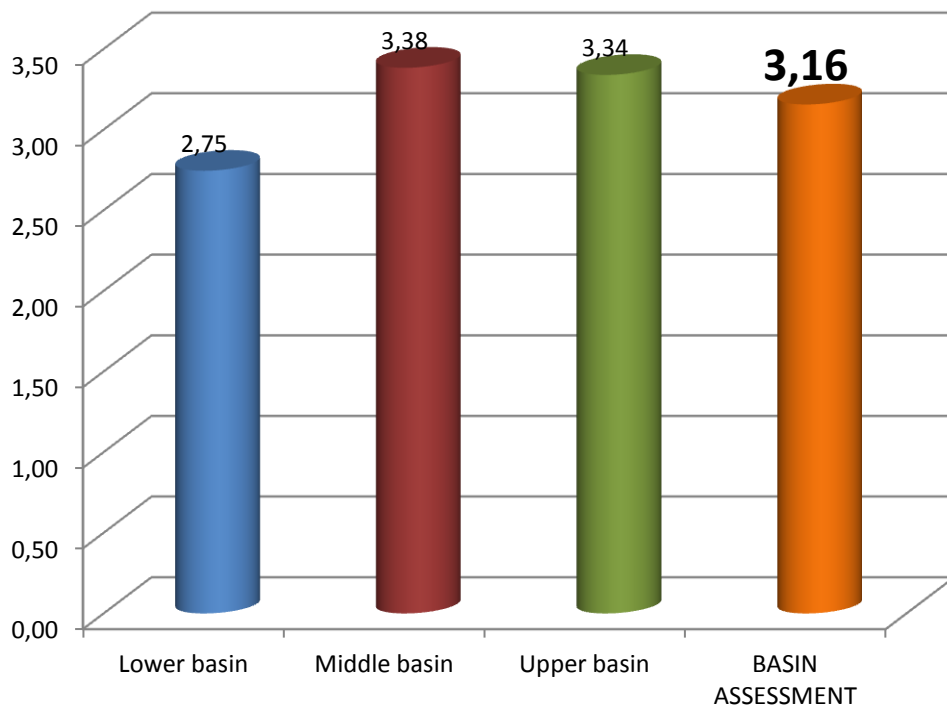


## 5. GENERAL INTERPRETATION OF RESULTS

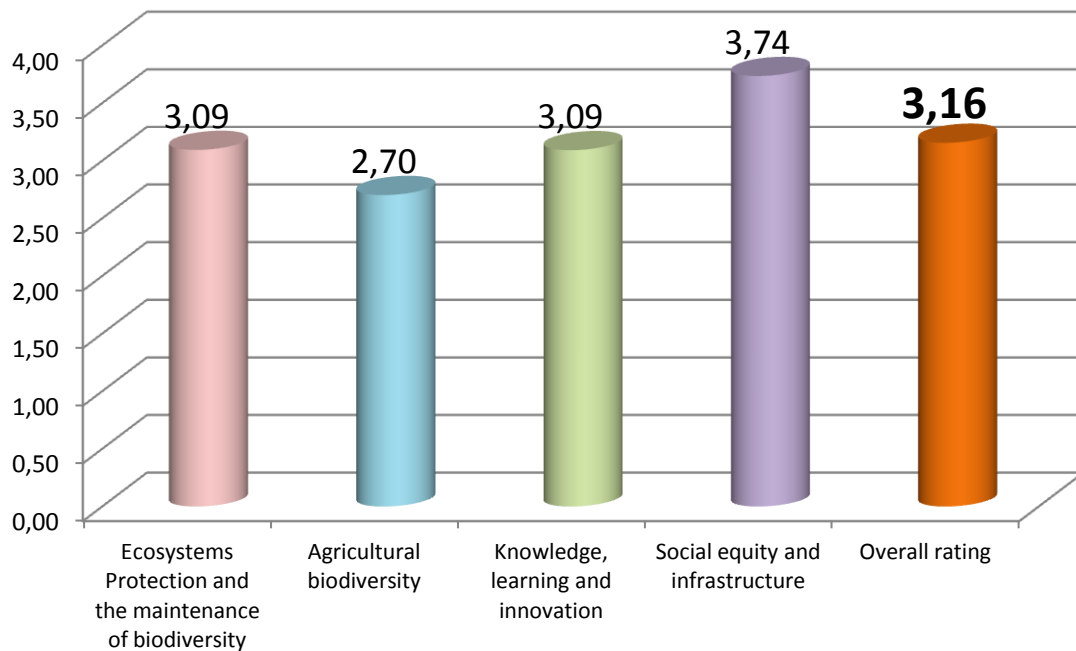
AVERAGES	Ecosystems Protection and the maintenance of biodiversity	Agricultural biodiversity	Knowledge, learning and innovation	Social equity and infrastructure	Overall rating
Lower basin	2.61	2.32	2.70	3.35	2.75
Middle basin	3.66	2.92	3.11	3.84	3.38
Upper basin	3.01	2.86	3.47	4.01	3.34
<b>BASIN ASSESSMENT</b>	3.09	2.70	3.09	3.74	3.16



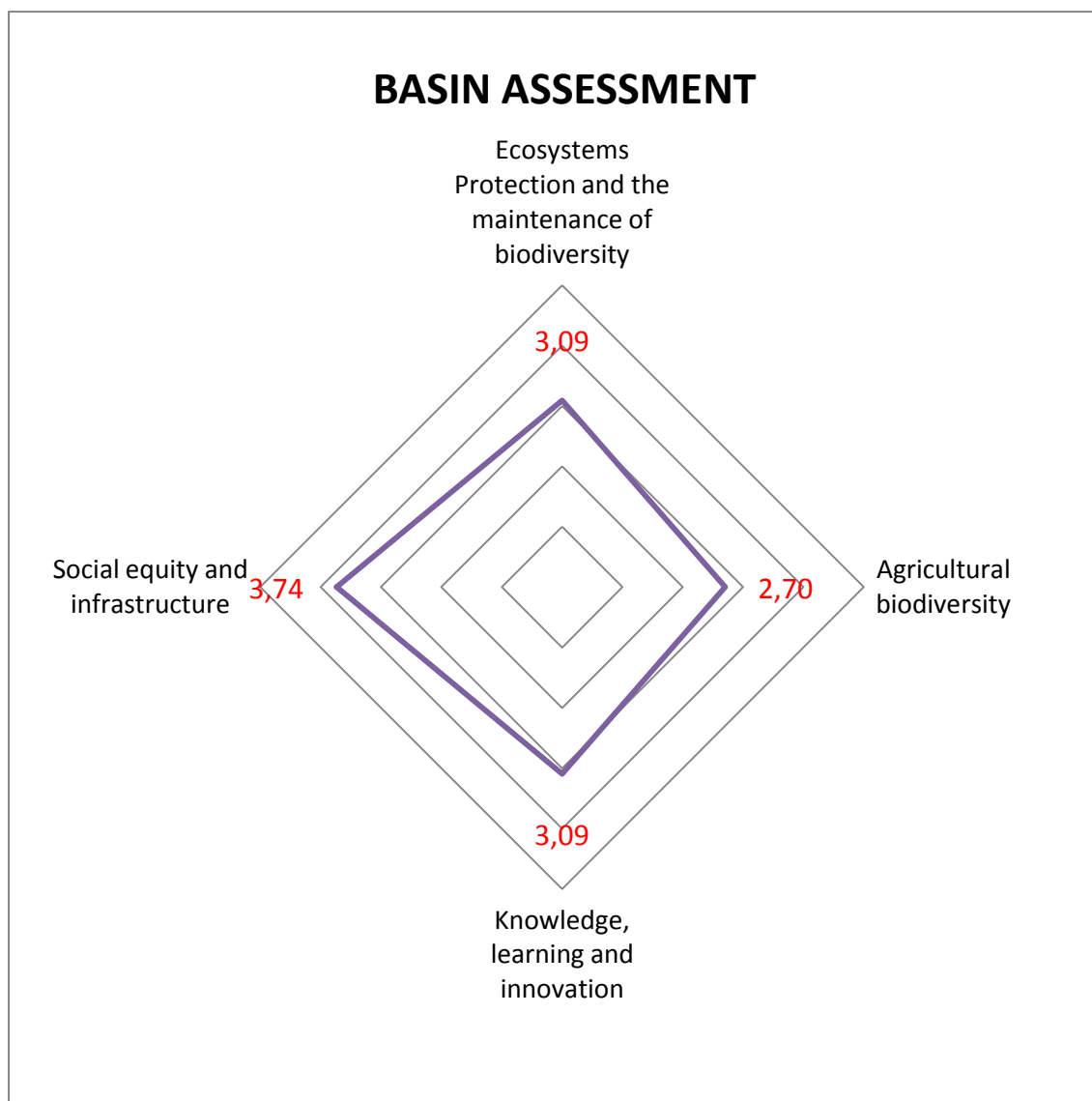
## SUB-BASIN GENERAL ASSESSMENT



## CATEGORIES ASSESSMENT







STANDARD DEVIATION	Protection and conservation of ecosystems	Agricultural biodiversity	Knowledge, learning and innovation	Social equity and infrastructure	Overall rating
Lower basin	0.76	0.64	0.73	0.64	0.69
Middle basin	0.59	1.15	0.61	0.42	0.69
Upper basin	0.58	0.96	0.81	0.49	0.71
<b>GENERAL ASSESSMENT</b>	0.65	0.91	0.72	0.52	0.70

The participants living within the basin, based on the results of the three workshops, clearly have a positive perception about the state of socio-ecological production landscape. The overall assessment is 3.16, ranking as good. On the issue of agricultural biodiversity, it is where participants rated the situation as poorer, but its score of 2.70, being fair to good, is closer to the category of good. The best qualified topic throughout the basin is social equity

and infrastructure approaching to very good (3.74), this responds to the fact that those cantons, in which the basin is located, have social development indicators (Índice de Desarrollo Social –IDS in Spanish) ranging from medium to medium high. (UNDP: 2000)

In the lower basin, evaluations are inferior in topics as Protection and Conservation of ecosystems and agricultural biodiversity. This may be due to the fact that the the lower basin is where plantation systems are monocultures of cucurbits, rice and sugar cane. In addition, tourist and industrial development have been accelerated in the last four years with the opening of the country's main highway (Route 27). The educational level of participants was much higher: several of the leaders invited are professional producers and therefore their critical level is higher. Their opinion is that the ecological situation is a little more delicate there due to the effects of what happens in the upper and middle basin are manifested in terms of erosion, sedimentation and silting up in the river mouth, causing flooding in the meandering lowland areas.

In the middle basin assessment is midway between good and very good (3.38) and up on the issues of protection and conservation of ecosystems and social equity and infrastructure. The condition of flat and undulating land, the high forest cover due to commercial fruit plantations and even the existence of gallery forests along rivers possibly determine a positive perception of the situation of socio-ecological production landscape. But again the issue of agricultural biodiversity is the worst rated. All general sense is that much has been lost and their agrobiodiversity exemplified by the lost landraces of mango, avocado and cashew, because commercial fruit crops of these are based on new, more productive and better-looking cultivars.

In the upper basin, the overall rating is good to very good (3.34), where social equity and infrastructure upload values, as well as knowledge, learning and innovation. The upper basin is the most homogeneous area, cultural and productive talking. Producers come from the same cultural matrix (called cartagos or white from the West Central Valley), practicing a single crop for over a century. Coffee growing is a coffee culture. This type of coffee farmers is very inclined to innovation and learning new knowledge on cultivation and its associated ecology.











## **6. LANDSCAPE MANAGEMENT STRATEGY**

### **6.1 Conceptual Framework for Intervention**

Satoyama Landscape Strategy in Jesús María River Basin reflects the commitment of Costa Rica with the United Nations Convention to combat desertification (UNCCD). Looking to create methodologies adapted to our context, to strengthen those landscapes showing good resilience and restore or retrieve the landscapes with greater land degradation and low potential to respond to extreme events of climate change. The strategy is based on using funds to leverage sustainable productive activities locally; to strengthen the institutional capacity of organizations; and increase knowledge of producers and society inhabiting the basin development in harmony with nature.

The central concept of the Satoyama Initiative is resilience. This term originates from the Latin verb *resilio*, meaning rebounding. In ecology is defined as the ability of ecosystems to resist, absorb, adapt to and recover from extreme disturbances, so return to form dynamic balance strengthened. A sustainable production system is one that is based on the resilience of the ecosystem in which it is located, leveraging all collaborative energies (synergies) of the diverse components of the particular ecosystem. A sustainable development strategy of high resilience is based on the attributes and positive values as strengths and opportunities.

### **6.2 Mission**

The Jesús María river basin community develops a culture of use and management of the diverse ecosystems in harmony with nature, with economic sustainability and based on traditional knowledge and those of modern science.

### **6.3 Vision**

A basin managed with a landscape integrated approach, with high resilience to climate change, managed by the concerned organizations through a Basin Committee and promoting locally sustainable productive activities.

### **6.4 Objectives**

#### **Strategic Objective**

Develop productive and sustainable local activities to strengthen the most resilient landscapes in order to improve the resilience of the most degraded landscapes.

#### **Specific Objectives**

- 1 To increase recovery capacity of the basin against natural phenomena and climate change.



- 2 To improve connectivity between different forest covers and diverse ecosystems.
- 3 To establish integral and sustainable agricultural production schemes in the socio-ecological landscapes.
- 4 To enhance the access to traditional and scientific knowledge about agrobiodiversity among the entire population.
- 5 To strengthen governance and effective landscape management through the organizations and institutions interested in increasing the resilience within the basin.

## 5.5 Program Results

### A. ECOSYSTEM PROTECTION

#### Outcome:

The phenomenon of land degradation is comprehensively attended by actions that prevent soil erosion and sediment transport to water bodies.

#### Indicators:

-300 coffee hectares managed under shade and organic agroforestry systems and with soil conservation works and vegetative ground cover management.

-400 hectares of fruit trees in agroforestry systems and integrated farms with soil conservation works and vegetative ground cover management.

-500 hectares of pasture resiliently and sustainably managed through silvopastoral systems (hedges, trees in pastures).

-20% income increase for the families directly involved in the projects.

#### Initiatives:

- Correct the constructive design of local farms and roads by engineering works preventing erosion and slow down water runoff.
- Support technical and environmental studies to dredge and channel the Jesús María river mouth.
- Soil conservation works in coffee as contours, sediment traps and increased coverage with arboreal (fruit and timber) and creeping plants.
- Set silvopastoral integrated farms systems with shaded trees in pastures , live fences, windbreaks, improved pastures, avoidance of forest fires and a better grazing management.
- Work on local management and solid waste recycling projects to avoid contaminating the fields and the flowing into water bodies.

- Campaigning tree planting and restoration of riparian forests throughout the watershed, including the restoration of hedges in the lower basin with *sotacaballo*, bamboo and native plants.

## **B. PRESERVATION OF BIODIVERSITY**

### **Outcome:**

Increased forest covers basinwide, through mechanisms such as PES and strengthening of protected areas (WPA).

### **Indicators:**

-35% of the area is under some forest cover (forests, reforestation, natural regeneration, fruticulture, coffee cultivation, agroforestry and silvopastoral systems).

-50 farmers receiving the Payments for Environmental Services (PES) incentive to maintain and increase forest cover. This incentive will be at least \$60 per hectare and it is expected to place at least 500 hectares in the PES Programme.

-An established biological corridor linking the gallery forests of the rivers within the basin with the Tivives Protected Area.

-The designed General Management Plan of the Protected Area Tivives.

### **Initiatives:**

- Create a specific Certificate for Environmental Services (CSA) for forest protection and soil conservation works and seek its funding from Caldera Port Authority for environmental services payment to avoid erosion.
- Create the Payment for Environmental Services (PES) within the basin for fruit trees that are timber or dendroenergy trees such as mango, avocado, *sapotáceas*, *nance* and others. Environmental services include carbon capture, water protection, erosion avoidance, enhancement of biodiversity and landscape embellishment.
- Create the Payment for Environmental Services in Agroforestry Systems (SAF-PES) in coffee plantations in the upper basin. Services are carbon sequestration, carbon deposits maintenance, avoidance of erosion, conservation of biodiversity, water protection and landscape embellishment.
- Contribute to the Cantonal Agricultural Centers (CACs) to gain greater share in the PES Programme (by FONAFIFO) and support the farmers to articulate a wider range of environmental services. Promote PES, SAF, Natural Regeneration and Reforestation among farmers.
- Contribute to the Tivives Protected Zone Management Implementation Plan and especially its core conservation area: the mangrove and estuarine system of the Jesus Maria river mouth (called Tivives Mangrove).

## **C. AGRICULTURAL BIODIVERSITY**

### **Outcome:**

Integral, sustainable and resilient agricultural production schemes established in the following socio-ecological landscapes: shade coffee in the upper basin, agroforestry fruticulture in the middle basin and silvopastoral farming in the middle and lower basin.

### **Indicators:**

-1200 hectares in organic and sustainable farming systems.

-20 rural communities working on resilient and sustainable production systems through integrated and organic farms.

-50 peasant families have increased their income by at least 20% due to water harvesting systems and mini-irrigation.

### **Initiatives:**

- Training and development to recuperate traditional knowledge about crops , crop collaborative partnership, *criollo* genetic resources, traditional ways of planting , medicinal and ornamental plants, small livestock and apiaries.
- Diversification of the production unit by creating comprehensive, sustainable and high resilience farms. Promoting mosaic of crops, mixed cropping, agroforestry and permaculture.
- Conservation and water management through harvesting systems using rainwater, small dams and water intakes for irrigation by drip, mini-irrigation, watering livestock and fishponds.
- Development of fair-trade or solidarity markets (local, regional, national and international); organic and sustainable products certification; increasing the added value with micro-mills, fruit collection centers, fruit processing factories and livestock auctions.

## **D. KNOWLEDGE, LEARNING AND INNOVATION**

### **Outcome:**

Increased and strengthened scientific and traditional knowledge and technological innovation between producers and farm owners and the general public.

### **Indicators:**

-A technical and scientific information bank about Jesús María basin created, set in online, and being administered by the Cantonal Agricultural Centers (CAC's) and supported by MAG and MINAE.

-20 communities improved their lifestyle and livelihoods by having better access to drinking water.

-50 schools benefited from the program of environmental education and organic agriculture.

**Initiatives:**

- Nature conservation and environmental education programs in all the schools of the basin and outreach programs through posters, radio and other media.
- Increase the economic contribution to the communities involved in community projects as aqueducts and forest protection in areas of recharge.
- Create a technical and scientific information bank about the basin to be accessible to all organizations and institutions working on the basin sustainability. This bank will disclose the studies.
- Create phylogenetic resources of traditional crops bank or collection, which allows to retrieve, expand and exchange these resources.

## **E. SOCIAL EQUALITY AND INFRASTRUCTURE**

**Outcome:**

Landscape management capacity of local and regional organizations strengthened.

**Indicators:**

-15 grass-roots organizations (such as Cantonal Agricultural Center, Aqueduct Associations, Associations of Integral Development and Peasant Associations) have worked with COMDEKS Project; strengthened and working in integrated management of resilient landscapes as a priority of their actions.

-Political steps taken to finalize: the payment for environmental services with the National Forestry Financing Fund (FONAFIFO); the Management Plan of the Tivives Protected Zone with the Ministry of Environment and Energy and the Highway Plan with Institute of Agrarian Development.

**Initiatives:**

- Strengthen Cantonal Agricultural Centers (CACs) and promote business among them in topics as: PES, agricultural marketing, project management and agricultural fairs.
- Strengthen ASADAS infrastructure in water distribution of rural aqueducts, build offices, improve water intakes and buy their aquifer recharge areas for reforestation and forest preservation.
- Strengthen interagency coordination among all entities working for the restoration of the basin, so that it becomes a single plan with a single strategy.

## 7. MONITORING AND EVALUATION

Landscape Strategy Jesús María River, with COMDEKS project, will have both a general follow up and a particular one to each funded project. This work will be made by the local office of SGP-UNDP, in collaboration with local organizations committed to the project.

We also have two types of evaluation, an external, by Satoyama consultants, and an internal by local organizations. The external evaluation will be:

**Ex ante:** this evaluation was performed during the project formulation process. There were held consultation workshops, proposed project initiatives and the design of the landscape strategy.

**During:** there will be a midterm external evaluation to identify the achievements and problems of the process, thereby redefining the plan and adjustments to project implementation.

**Ex post:** this evaluation will be external, to measure implementation success (efficiency), compliance with performance (effectiveness) and measuring impacts (effectiveness) attributable to the actual project.

The evaluation by local organizations will be using the Baseline Assessment instrument of Satoyama Initiative. The same organizations and, if it is possible, the same leaders will apply the same indicators established in the Socio Ecological Productive Landscapes (SEPL) methodology. The rate difference between the current and the future measurements, in the annual exercise, will be what defines the impact of the project in Jesús María river basin landscape.

## 8. KNOWLEDGE MANAGEMENT

The project will generate knowledge, practices, methods and management systems and socio-ecological landscapes in Jesús María River Basin for the purpose of replication, development and integration of initiatives in the other eight basins identified by CADETI as the most degraded of Costa Rica. Collect and analyze information obtained from community projects and other sources, to identify best practices and knowledge for dissemination to other communities, programs, organizations and institutions. This exchange of information and knowledge will be a valuable contribution to policy formulation at national and regional level.

The results will be shared across the organizations and leaders, training courses for the subjects of the initiative, seminars for horizontal and vertical exchange between professionals, politicians and businessmen in the basin. Special emphasis would be given to initiatives identified during the planning process; such as the scientific and technical information bank, that could be managed by the CACs through its web sites. It would have all scientific and technical information accomplished by government agencies, universities and research institutes, so that the subjects of the initiative and their organizations can have access.

An intensive outreach and environmental education program will also be developed in schools through posters, brochures, videos and other audiovisual resources for youth to learn about the ecology of the basin and the Project.

Each year there will be a workshop to evaluate the project and the space will become a discussion forum to draw lessons and learning on the Satoyama Initiative. Those findings will be used to replicate in other socio-ecological production landscapes.



## 9. LOGICAL FRAMEWORK: INITIATIVE SATOYAMA IN JESÚS MARÍA RIVER BASIN

**MISSION:** The Jesús María river basin community develops a culture of use and management of the diverse ecosystems in harmony with nature, with economic sustainability and based on traditional knowledge and those of modern science.

**VISION:** A basin managed with a landscape integrated approach, with high resilience to climate change, managed by the concerned organizations through a Basin Committee and promoting locally sustainable productive activities.

	INTERVENTION	RESULTS	INDICATORS / VERIFICATION SOURCES	HYPOTHESES / ASSUMPTIONS TERMS
<b>General Objective</b>	Develop productive and sustainable local activities to strengthen the most resilient landscapes in order to improve the resilience of the most degraded landscapes.	Established sustainable and resilient landscapes in coffee growing, fruit and silvopastoral livestock.	Annual baseline assessment (SEPL) during three years.	All organizations and institutions involved agreed on one strategy for Jesús María basin restoration.
<b>Specific Objectives</b>	1 To increase recovery capacity of the basin against natural phenomena and climate change.	The phenomenon of land degradation is comprehensively attended by actions that prevent soil erosion and sediment transport to water bodies.	-300 coffee hectares managed under shade and organic agroforestry systems and with soil conservation works and vegetative ground cover management. -400 hectares of fruit trees in agroforestry systems and integrated farms with soil conservation works and vegetative ground cover management. -500 hectares of pasture resiliently and sustainably managed through silvopastoral systems (hedges, trees in pastures). -20% income increase for the families directly involved in the projects.	All institutions linked to this topic coordinate their agendas through CADETI.

<b>Specific Objectives</b>	2 To improve connectivity between different forest covers and diverse ecosystems.	Increased forest covers basinwide, through mechanisms such as PES and strengthening of protected areas (WPA).	<p>-35% of the area is under some forest cover (forests, reforestation, natural regeneration, fruticulture, coffee cultivation, agroforestry and silvopastoral systems).</p> <p>-50 farmers receiving the Payments for Environmental Services (PES) incentive to maintain and increase forest cover. This incentive will be at least \$60 per hectare and it is expected to place at least 500 hectares in the PES Programme.</p> <p>-An established biological corridor linking the gallery forests of the rivers within the basin with the Tivives Protected Area.</p> <p>-The designed General Management Plan of the Protected Area Tivives.</p>	FONAFIFO shows openness to new forms of PES.
	3 To establish integral and sustainable agricultural production schemes in the socio-ecological landscapes.	Integral, sustainable and resilient agricultural production schemes established in the following socio-ecological landscapes: shade coffee in the upper basin, agroforestry fruticulture in the middle basin and silvopastoral farming in the middle and lower basin.	<p>-1200 hectares in organic and sustainable farming systems.</p> <p>-20 rural communities working on resilient and sustainable production systems through integrated and organic farms.</p> <p>-50 peasant families have increased their income by at least 20% due to water harvesting systems and mini-irrigation.</p>	MAG and MINAET coordinate good technical work.

<b>Specific Objectives</b>	4 To enhance the access to traditional and scientific knowledge about agrobiodiversity among the entire population.	Increased and strengthened scientific and traditional knowledge and technological innovation between producers and farm owners and the general public.	-A technical and scientific information bank about Jesús María basin created, set in online, and being administered by the Cantonal Agricultural Centers (CAC's) and supported by MAG and MINAE. -20 communities improved their lifestyle and livelihoods by having better access to drinking water. -50 schools benefited from the program of environmental education and organic agriculture.	It is ensured that the MAG, FAO, CATIE, CONAREFI have good coordination for training and technology transfer in phytogenetic resources conservation.
	5 To strengthen governance and effective landscape management through the organizations and institutions interested in increasing the resilience within the basin.	Landscape management capacity of local and regional organizations strengthened.	-15 grass-roots organizations (such as Cantonal Agricultural Center, Aqueduct Associations, Associations of Integral Development and Peasant Associations) have worked with COMDEKS Project; strengthened and working in integrated management of resilient landscapes as a priority of their actions. -Political steps taken to finalize: the payment for environmental services with the National Forestry Financing Fund (FONAFIFO); the Management Plan of the Tivives Protected Zone with the Ministry of Environment and Energy and the Highway Plan with Institute of Agrarian Development.	Political will of all parties to coordinate.

<b>Activities</b>	a. Correct the design and construction of secondary and farms roads.	100 kilometers of roads operated.	GIS	The project is executed with INDER and the municipalities. SGP, MINAE, MAG and other local organizations make policy efforts for its approval.
	b. Works on soil conservation in coffee farms.	300 hectares of coffee with soil conservation.	GIS	There are funds of SGP and Satoyama Initiative.
	c. Establish integrated farms on silvopastoral systems.	10 integrated farms established.	GIS	There are funds of SGP and Satoyama Initiative.
	d. Local projects for solid waste management and recycling.	10 community projects in operation.	Implementation reports	There are funds of SGP and Satoyama Initiative.
	e. A tree planting campaign.	10,000 trees planted on the river banks.	GIS	There are funds of SGP and Satoyama Initiative.
	f. Create a specific Certificate for Environmental Services for forest protection.	CSA designed and in operation, covering 500 hectares.	GIS	The Port Caldera Authority purchases the CSA. SGP, MINAE, MAG and local organizations make policy efforts for its approval.
	g. Create a specific Certificate for Environmental Services (CSA) within the middle basin for fruit trees.	400 hectares of fruit trees in CSA.	GIS	FONAFIFO adopted this modality. SGP, MINAE, MAG and local organizations make policy efforts for its approval.

<b>Activities</b>	h. Establish the Payment for Environmental Services in Agroforestry Systems (PES-SAF) for coffee.	300 hectares of coffee in PES-SAF.	GIS	FONAFIFO adopted this modality SGP, MINAE, MAG and local organizations make policy efforts for its approval.
	i. Contribute to the Cantonal Agriculture Centers (CACs) to gain a greater share of PES.	300 hectares. In Protection modality and 200 hectares in Natural Regeneration of much degraded pastures.	GIS	FONAFIFO has opening SGP, MINAE, MAG and local organizations make policy efforts for its approval.
	j. Support the elaboration of Tivives Protected Area Management Plan.	Management Plan of the Tivives Protected Area ongoing.	Management Plan	Costa Rica Forever finances it. SGP, MINAE, MAG and local organizations make policy efforts for its approval.
	k. Training leaders in traditional knowledge management.	10 training courses.	MAG-MINAE reports	There are funds of SGP and Satoyama Initiative.
	l. Water conservation and management.	10 projects for water harvesting.	Implementation reports	There are funds of SGP and Satoyama Initiative.
	m. Development of fair and solidarity markets	The three CACs are associated to access a fair o solidarity market.	Implementation reports	CACs get funding.
	n. Environmental education program	50 schools covered.	Implementation reports	There are funds of SGP and Satoyama Initiative.

<b>Activities</b>	o. Create a technical and scientific information bank.	phytogenetic resources bank created.	Implementation reports	SGP, MINAE, MAG and local organizations make policy efforts for its approval.
	p. Create phytogenetic resources a bank or a collection.	Created the phytogenetic resources bank.	Implementation reports	SGP, MINAE, MAG and local organizations make policy efforts for its approval.
	q. Support productive projects for women	10 projects for sustainable development operated by women.	Implementation reports	SGP, MINAE, MAG and local organizations make policy efforts for its approval.
	r. Strengthen Agricultural Cantonal Centers (CACs)	Fund for institutional strengthening.	Implementation reports	There are funds of SGP and Satoyama Initiative.
	s. Strengthen ASADAS' infrastructure	10 ASADAS supported.	Implementation reports	There are funds of SGP and Satoyama Initiative.
	t. Strengthen inter-agency coordination	Coordination roundtable working and supported by CADETI.	Implementation reports	There are funds of SGP and Satoyama Initiative.



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