



AVACLIM Project -Component 2
Summary
Evaluations of agroecological initiatives
India

January 2021

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Summary



Introduction

Presentation of the AVACLIM project

The AVACLIM project (2020-2022) was built on the conviction that agroecology is one of the most promising approaches to achieve the mitigation and adaptation potential of food and agricultural systems to climate change and to strengthen their resilience. Implemented in seven countries (Brazil, Burkina Faso, Ethiopia, India, Morocco, Senegal and South Africa), the project is coordinated by CARI, a French NGO, and implemented by partner NGOs. In India, the partner NGO is Gram Bharati Samiti (GBS, Society for Rural Development) whose mission is "to establish a society based on humanitarian and democratic values and an ecologically balanced habitat".

Despite the growing recognition of agroecology, it often remains a theoretical option for policy makers. In this context, the AVACLIM project aims to strengthen the sharing of knowledge gained by practitioners in the field, to evaluate agroecological initiatives and to implement advocacy, based on this scientifically validated evaluation, towards national and international political institutions.

Thus, the seven NGO partners, in partnership with national research teams, carried out a scientific evaluation of two agro-ecological initiatives in each country according to a methodology specific to the AVACLIM project. The national scientific partner of the project is Grameen Vikas Samiti (GVS). This NGO's mission is to address social inequalities, promote rural health care and community development programmes, and support disadvantaged, excluded and vulnerable children.

This document is a synthesis of the evaluation reports produced for the two initiatives in India.

Presentation of the methodology for evaluating agroecological initiatives

What is an agroecological initiative?

Agroecology is an approach to rethinking food systems with the aim of achieving ecological, economic and social sustainability.

The AVACLIM project characterises agroecology in its multi-dimensionality at the scale of a territory and is interested in agroecological initiatives. These can take the form of social, economic and agro-environmental innovations and provide a specific response to a local need. The agroecological initiatives selected for evaluation were chosen according to different criteria: they must be at least 5 years old in order to have sufficient historical data, be anchored in a territory and in a collective network, have general and historical data and approach agroecology in a holistic way.

AVACLIM multi-criteria assessment methodology

The assessment is carried out using a prototype proposed by the AVACLIM scientific consortium, based on an aggregate of methodologies. **Twenty-six existing** assessment

methodologies were studied, in order to propose a single methodology that attempts to overcome certain limitations: multiplicity, lack of inclusion of the different dimensions, adaptation to agriculture and not to agroecology, etc. Among the methodologies used to build the AVACLIM prototype are **LUME** (Petersen *et al*, 2020), the **Framework for the Analysis of Interactions between Sectors and Territories** (Madelrieux *et al.*, 2017) - 2017, **TAPE** (FAO, 2019), **Memento du GTAE** (Levrard & al., 2019) and **TATA Box** (Audouin *et al.*, 2018).

The Avaclim evaluation methodology is built around four stages: three framing stages to understand and characterise the initiatives studied, and a fourth central stage of multi-criteria and multi-actor evaluation of the initiatives' effects. The following infographic (fig. 1) presents the different stages and their objectives.

Through a multi-criteria analysis, step 4 seeks to quantify the effects of the initiative in four main dimensions: **quality of life and well-being, technical-economic performance, ecosystem health and resilience.**

To feed these four dimensions, **87 indicators** were proposed by the French research team, which the scientific partners and NGOs in each country selected and adapted in order to carry out the evaluation of the selected initiatives. The data collected was then compared to reference values to judge the performance of the initiative. **The results are expressed as a percentage of a maximum score, which is considered an agro-ecological optimum.**

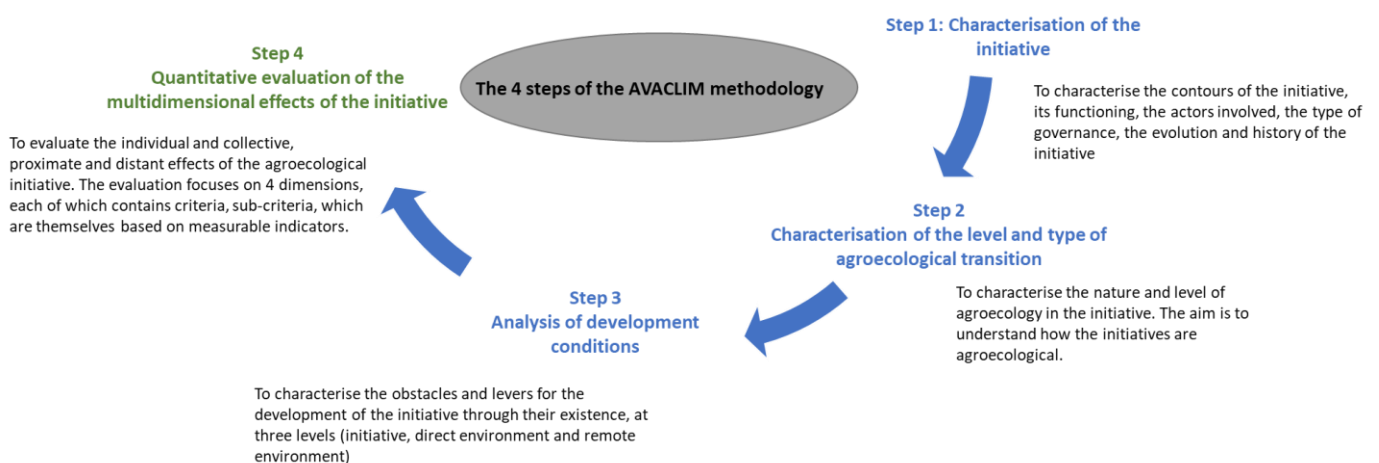


Figure 1. Stages of the AVACLIM assessment process
 Scoping (blue) and evaluation (green) stages

Vaagdhara

Description of the initiative

The initiative is taking place in the agricultural districts of Banswara and Aandi (Vagad region) in Rajasthan, an area of high natural biodiversity. At the time of its inception in 2011, the soils in the area were degraded due to inappropriate cultivation, resulting in poor crop yields and poverty. Most of the farmers in these districts depended on agriculture and livestock; they were extremely poor and mostly illiterate. Recurrent droughts, dominant crops with no market value, inadequate infrastructure, small farm size, lack of off-farm employment, poor access to markets and lack of credit all contribute to the poverty of these people.

Vaagdhara (Voluntary Association of Agricultural General Development Health and Reconstruction Alliance) is the name of an NGO, established in 1987, whose objective is to support community institutions and empower communities - especially those in marginalised tribal areas - to implement sustainable development. To this end, Vaagdhara implements the Sustainable Integrated Production System (SIPS) approach to help farmers transform their farms into more productive and sustainable systems. This is based on agro-ecological production, product processing and access to markets to increase farmers' livelihoods. It aims to intensify the farming system through agroecological practices (such as crop mixing, vegetable gardens, agroforestry, integration of livestock - especially poultry - and aquaculture). This approach is also based on training (according to needs and demands) in agricultural practices and techniques, as well as on farm visits for sharing experiences. Participatory learning processes, involving farmers, experts and facilitators, help to design improved production systems adapted to natural resources, local knowledge and skills, as well as household needs (including food) and market opportunities.

In the study area, the main crops grown during the *Kharif* (summer monsoon) season are maize, rice, soybean and cotton, while wheat, mung bean and barley are those grown during the *Rabi* (winter season). Farmers also raise livestock (poultry, cattle, goats, buffalo). Some fodder is produced on the farm (maize, cowpeas, etc.). The use of chemical inputs is minimal or non-existent, thanks to the recycling of agricultural residues within the farm (vermicompost, compost, biofertilisers, etc.).

The women set up integrated farming systems and created vegetable gardens using the Wasteland Agriculture Development Intervention (WADI) approach. This approach aims to restore degraded soils while cultivating them with vegetable crops. The Sloping Agricultural Land Technology (SALT) approach has also been adopted for sloping land to gradually transform it into terraces for crops, through the establishment of leguminous hedges on the contour lines.

All agricultural land is irrigated, so crops are dependent on water supply and sensitive to shortages. The farms implement techniques to reduce water use through drip irrigation, which allows for more efficient water use. In addition, farmers have been trained in different techniques and practices such as soil water conservation, pest management, composting, etc., as well as in marketing agricultural products. In addition, technical

assistance, including suggestions and advice, is provided by Vaagdhara scientists and the Agricultural Department of the State Government of Rajasthan. The Agricultural Research Station (ARS) and the Krishi Vigyan Kendra of the Maharana Pratap University of Agriculture & Technology also provide technical support.

In 2014, the Tribal Food and Grain Initiatives Producer Company Limited was established and registered by Vaagdhara. This company helps its members, mainly tribal families, to benefit from the "fair trade" label through a "seed to table" process (quality inputs and seeds, etc.).

Women's empowerment is promoted through their literacy and the provision of micro-credit through Self Help Groups (SHGs). This is an informal lending system to meet urgent demands and consumption needs. The aim of the formation and operation of SHGs is to provide alternatives to the practices of moneylenders in the region. In addition, VAAGDHARA credits of nearly INR 5,500,000 have been provided to nearly 180 SHGs. Women have also been assisted in obtaining loans from banks for their entrepreneurial activities. The empowerment of women has been manifested to some extent through increased participation in decision making within and outside their families. In addition, 40% of the agricultural labour force is female and 90% is tribal (tribes constitute more than three-quarters of the local population).

From now on, 444 families (514 beneficiaries) from six villages are involved in this initiative (2021 figures) on an area of over 120 ha.

The main actors

- **National partners:** Gran Bharati Samiti (GBS), Grameen Vikas Samithi (GVS)
- **Beneficiaries:** 444 rural families
- **Other stakeholders:** Maharana Pratap University of Agriculture & Technology (MPUA&T)

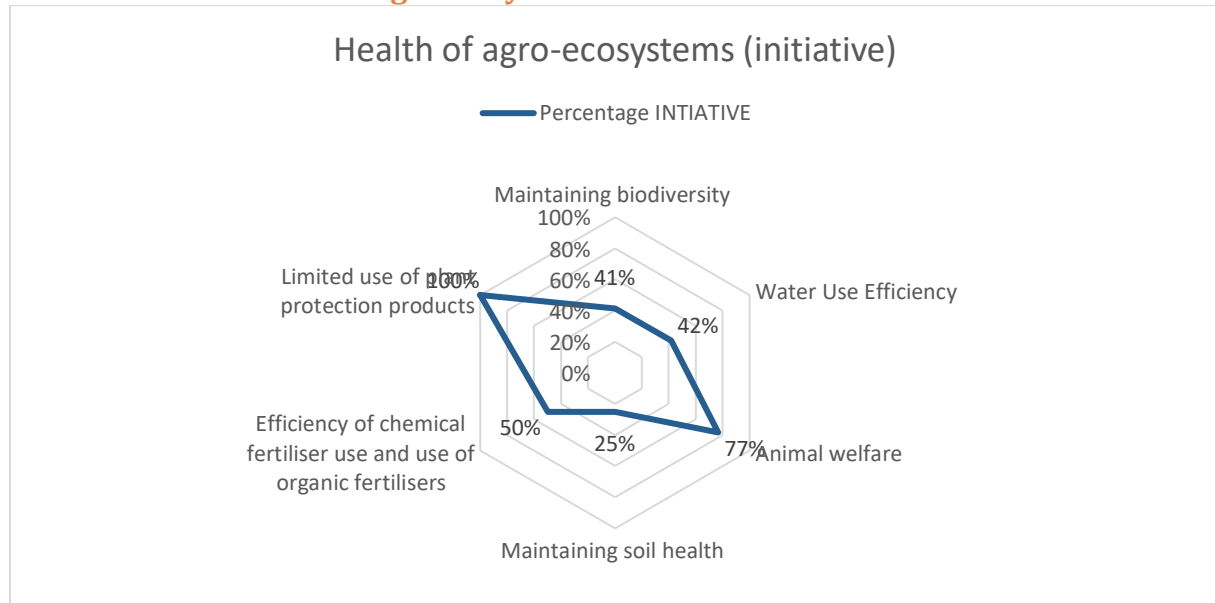
Quantitative results

- 444 families (514 beneficiaries) from six villages associated with this project on an area of over 120 ha
- Creation of 179 SHGs from marginalised communities

For more information: <https://avaclim.org/fiches-initiatives-inde/>

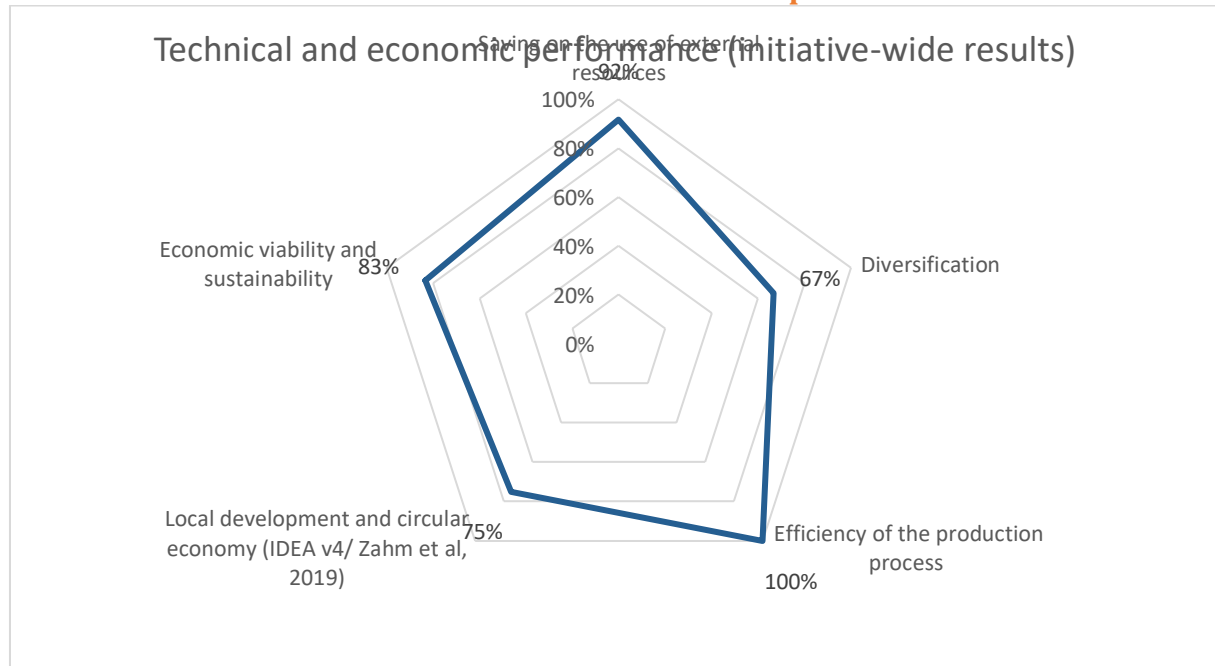
Presentation of the lessons learned on the four dimensions

Agroecosystem health dimension



The initiative has an average overall performance (56%) regarding the health of agro-ecosystems. The initiative performs very well on **the use of plant protection products** (100%). Indeed, crop protection is entirely ensured by the use of biological control methods: use of neem extract for example, fungal (*Trichoderma*) or bacterial (*Pseudomonas*) biological agents, late mowing (no shredding), multi-annual management of hedges, etc. Furthermore, the **welfare of the livestock** is high (score of 77%) as they do not suffer from hunger or thirst; they benefit from a certain comfort and care. On the other hand, **the efficiency of the use of chemical fertilisers and the use of organic fertilisers** shows an average result (50%), even if manure is produced on the farm (up to 8 t) and used as organic fertiliser, the low integration of leguminous crops in the crop rotation undermines the result **Water use efficiency** and **biodiversity conservation** score low (42% and 41% respectively). This is because all farmland is irrigated, making the farm dependent on water supply, but irrigation is provided by a drip system, making water use more efficient. Furthermore, although agrobiodiversity is high (Simpson index above 70%), it does not include any rare or endangered animal or plant species, and genetic diversity is low, with the livestock being exclusively purebred. Finally, **soil health** is little affected by the initiative (score of 25%). Indeed, the infiltration rate (assessed by the Berkaan method) is average, reflecting a soil structure prone to runoff. This is probably due to the fact that part of the soil is left bare after cultivation. Soil use influences the organic matter (and thus organic carbon) content of the soil. For example, soils under permanent vegetation accumulate more organic matter than under field crops (0.85% *versus* 0.36%, between 0 and 15 cm depth). In addition, grassy soils contain a higher proportion of coarse aggregates (>5 mm) compared to other soil uses. The physico-chemical properties of the soil show significant variations according to the soil use.

Dimension "Technical and economic performance

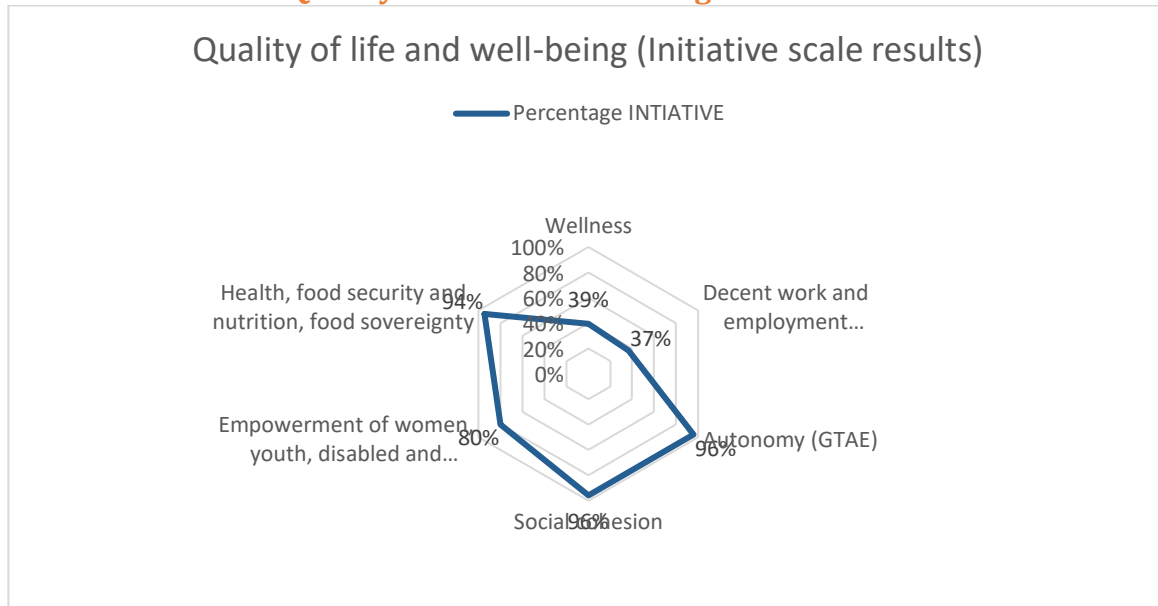


The initiative has a good technical and economic performance (overall score of 83%). It has a maximum impact on the **efficiency of the production process** (100%). Indeed, crop yields, particularly maize (2.4 to 3 t/ha), are higher than or equal to national averages (2.43 t/ha, Progress Report Kharif Maize ,2012). For other crops, production levels are also high, for example guava (8 t/ha) and mango (6 t/ha). **The savings made on the use of external resources** are also significant (score of 92%) because the farms produce most of the inputs they use locally, particularly organic fertilisers (manure). Thus the initiative is sober in the use of inputs required for agricultural production, it is estimated that the expenditure on inputs is INR 3,921/ha (about USD 50/ha). In addition, the self-consumption rate is high, averaging 65% on the initiative's farms. The **economic viability and stability** of the farms is important (83%) thanks to different sources of external income (pluriactivity), in addition to efficient agricultural production. Since 2014, the creation of the Tribal Food and Grain Initiatives Producer Company Limited has helped its members to benefit from the "fair trade" label and *ultimately* access to new markets.

The initiative also performs well:

- **local development and the circular economy** (score of 75%) with 60% of agricultural production used locally. In addition, the few inputs purchased are from local suppliers. The initiative also contributes to employment in the area, with the creation of new economic opportunities. Collective work is also favoured, which has improved solidarity at the local level, efficiency for certain agricultural work and therefore economies of scale;
- **crop diversification** (67%): rice represents on average half (52%) of turnover. However, crop diversification could be improved to ensure greater economic resilience of farms.

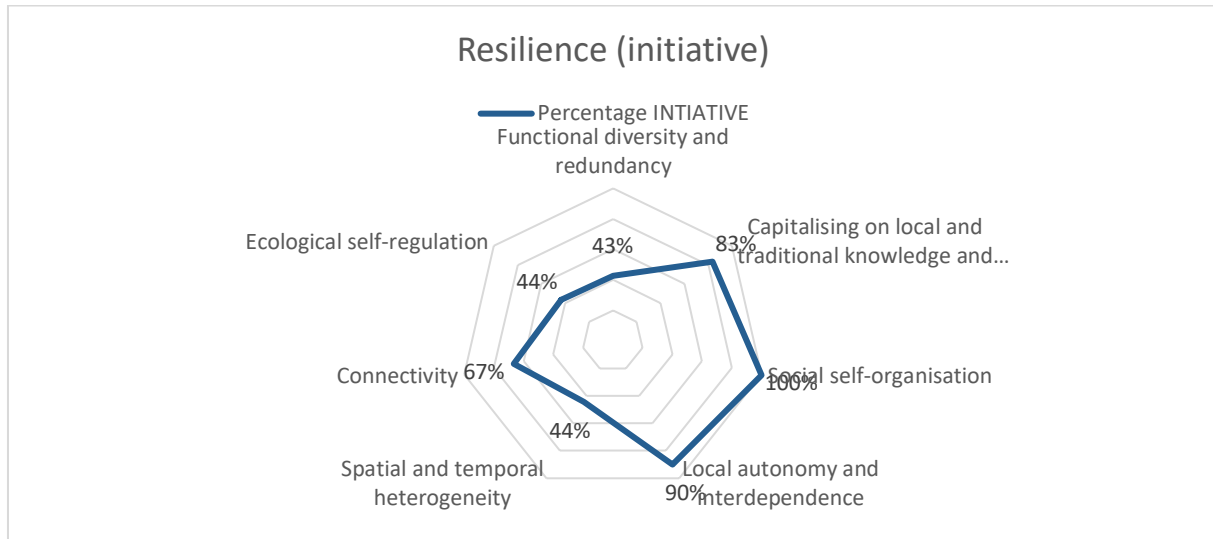
Quality of life and well-being" dimension



The initiative scores 72% for the dimension "quality of life and well-being". Indeed, **autonomy** and **social cohesion** are important within the initiative (score of 96%). The producers are independent in terms of inputs and they express a strong sense of autonomy in the different agricultural activities: choice of production and methods used, etc. The members of the initiative participate in networks for sharing knowledge and experience and are involved in professional structures. For example, the members of the initiative are part of Saksham Samuh, a self-help group for collective actions (loan of agricultural equipment, production support, etc.). Collective work thus represents up to 20% of the total turnover of the farms studied. The links developed through collective work and participation in networks or professional structures develop solidarity and social cohesion between the members of the community. Women are members of SHGs, which gives them access to micro-credits. SHGs also bring them together, allow them to express themselves and implement social and economic improvements through small activities. This aspect contributes to their **empowerment** (score of 80%). On the other hand, ownership of productive assets is still held by husbands.

The initiative also has a significant impact on **health, food security, nutrition, and food sovereignty** (score of 94%). Indeed, all the crops are grown for human consumption. In addition, agricultural production and the income generated by their activities help producers and their families to access a wide range of quality and pesticide-free foods: cereals, roots and tubers and plantains, pulses (beans, peas, lentils), nuts, seeds, dairy products, meat, etc. Despite this good performance, the level of **well-being** of the members of the initiative is low (39%), assessed here by their economic wealth: this indicator is based on the absence or presence of goods owned by the household: this list has not been sufficiently adapted to be relevant to the local context. Finally, the "**decent work**" criterion scored low (37%) due to the arduous nature of the tasks, the lack of labour and tools. However, more than 40% of the workforce are women and 90% belong to tribal communities.

Resilience dimension



The performance of the resilience initiative is high (overall score of 68%) due to good results in the following areas

- **Social self-organisation** is significant (100% score) within the initiative, with the existence of collective work (20% of turnover), the development of mutual aid and the involvement of members in professional structures;
- **Local autonomy and interdependence** are high (90%) due to the producers' independence from organic fertilisers (produced on the farm) and the high percentage of self-consumed products. Agricultural production also contributes to the local economy through the valorisation of resources and the marketing of part of the production locally.

The **capitalisation of local and traditional knowledge and learning from past experiences** also scores well (83%) due to farmers' participation in training and knowledge and skills sharing networks and the existence of knowledge creation and transfer platforms. The 'Kisaan Mela' is a day-long event before the summer monsoon that provides farmers with the opportunity to learn about the latest agricultural techniques through lectures and discussions, including with experts. This platform offers the farming community and researchers the opportunity to meet and exchange knowledge. As a result, **connectivity** is relatively high (67%) at the social level. In contrast, the initiative performs poorly on **functional diversity and redundancy** (score of 43%). Although crop diversity is quite high, rice and maize account for a large share of the cultivated area and turnover. However, more resistant local varieties are combined with improved varieties and these productions lead to a significant diversity of food products. Finally, the farms have only one source of water and energy. For other inputs, the farms use several suppliers.

Spatial and temporal heterogeneity and **ecological self-regulation** score average (44%). Indeed, although the diversity of varieties and breeds is good, none of them is protected. The absence of chemical inputs is favourable to ecological self-regulation, but the low share of legumes in crop rotations and the presence of bare soil at certain times of the year are practices that need to be improved.

Renuka's organic farm

The Renuka Organic Farm was set up in 2005 with the objective of restoring (through soil improvement and sanitation practices among others) 8 ha of degraded and uncultivated land in the village of Routhu Suramala (Chittoor District, Andhra Pradesh State).

Before the initiative was launched, the farm manager participated in Farmer Field Schools trainings on tomato and groundnut cultivation (organised by the Agriculture Man Ecology Foundation in Bangalore), which provided him with knowledge on agroecological practices. In the first year of the initiative, mango and sapodilla trees were planted and paddy was grown. Numerous species have since been introduced: vegetables (beans, peppers, tomatoes, etc.), leafy vegetables (spinach, amaranthus), about thirty fodder species (Guinea grass, fodder groundnuts, etc.), flower crops (rose, tuberose, etc.)... Only traditional, locally produced agroecological inputs are used: manure, biofertilisers, green manure (*Sesbania bispinosa*), vermicompost, etc. A vermicomposting pit has been installed. Plant protection products are also natural (Pongomia, biological agents such as *Trichoderma* and *Pseudomonas*, etc.). Plants with insecticidal properties are grown on the edges of the fields. Only the paddy field is ploughed deeply, with manual tillage otherwise. A well has been dug in the open and a pond. A drip irrigation system was installed in 2007 for planting and growing paddy. Since 2017, this farm has been using solar dryers (using solar panels) to dry groundnuts, chillies, tomatoes, paddy, etc. The relative humidity of the agricultural products is carefully controlled to eliminate aflatoxins caused by too much post-harvest humidity. The products are then packed in airtight bags. The farm raises chickens, cows and bulls as well as sheep. The animals are kept in a stable at night and graze in the open field during the day. Fattening is carried out only on rams with feed supplements. The farm produces its own feed (with 30 different types of fodder). Only feed supplements (calcium, liver tonic, vitamins A, D, E) for fattening are purchased. The farm also has a "celestial garden" "celestial garden (*Nakshatra vanam*) created in 2016 associating 27 species of trees that symbolise the 27 birth stars (*Nakshatras*) according to Indian astrology. These sacred trees have a strong social, cultural, medicinal, phytosanitary and aesthetic value. Indeed, these cultivated trees are used to make known their importance and their different uses.

Most agricultural products are sold in the village. Some, such as mangoes, are also sold on the local market. In addition, the farm has a contract (signed in 2021) to sell paddy to Srinergy, an Indian-American company. Thus, rice processing and paddy marketing are currently the main economic activities of the farm. The rice is processed mechanically in the nearby river to ensure the quality of the products obtained. These post-harvest practices are an undeniable added value of the initiative.

Currently, 20-25 people - half of them women - are employed on a contract basis to work on the farm. There are 7 permanent employees, half of whom are women. The wife of the farm owner has also been elected president of the village council.

Grants were provided by the state of Andhra Pradesh and foreign funding agencies for the development of the farm: creation of a nursery, a pond, installation of solar panels, etc. The farm is now financially independent. The farm is now financially independent. The project has thus not only contributed to increasing land use efficiency, but also to improving the livelihoods and economic growth of the farmers. Over the years, these

positive results have encouraged more and more farmers to join this agroecology project in the state of Andhra Pradesh.

Since the beginning, the NGO GVS has been advising the farm and providing training on agro-ecological practices, dryland farming, sustainable land management, etc. Local knowledge and experience is shared through training and practice exchange. Local knowledge and experience is shared through training and exchange of practices. The farm has had a training room since 2018 and courses are given there as needed. GVS also organises visits to agro-ecological farms for those who wish to engage in this approach. GVS also presents these farms to potential donors in order to obtain the necessary funding for their development. Technical assistance is provided by scientists from the Regional Agricultural Research Station (RARS, Tirupati) of Acharya N.G. Ranga Agricultural University, and Sri Venkateswara Agriculture College-Tirupati, and they also assist in knowledge sharing. Organic farms are invited to agricultural programmes to share their knowledge.

The Renuka organic farm now acts as an incubator for local farmers to build capacity and develop knowledge on agroecological practices. Since its inception, the initiative has gradually expanded to neighbouring farms and agroecological production systems have been implemented on 405 ha of restored land. The Renuka organic farm now works with 620 families.

The main actors

- **National partners:** Gran Bharati Samiti (GBS), Grameen Vikas Samithi (GVS)
- **Beneficiaries:** Renuka organic farm
- **Other stakeholders:** Regional Agricultural Research Station (RARS, Tirupati), Acharya N.G. Ranga Agricultural University, Sri Venkateswara Agriculture College-Tirupati

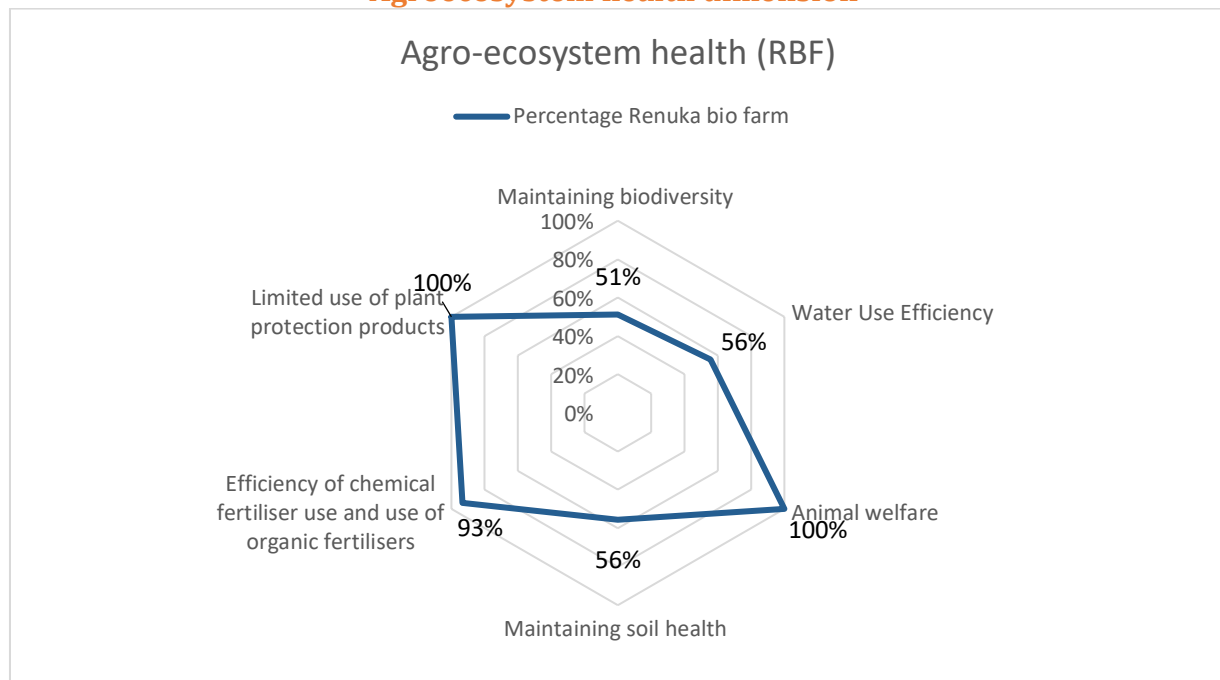
Quantitative results

- Installation of solar dryers, a vermicomposting pit and a drip irrigation system
- Construction of a training room on the farm
- Signature of a contract for the sale of paddy with Srinergy
- Creation of a "celestial garden" with 27 species of trees
- Implementation of agroecological production systems on 8 ha
- In the end: 405 ha of restored land and collaboration of the farm with 620 families

For more information: <https://avaclim.org/fiches-initiatives-inde/>

Presentation of the lessons learned on the four dimensions

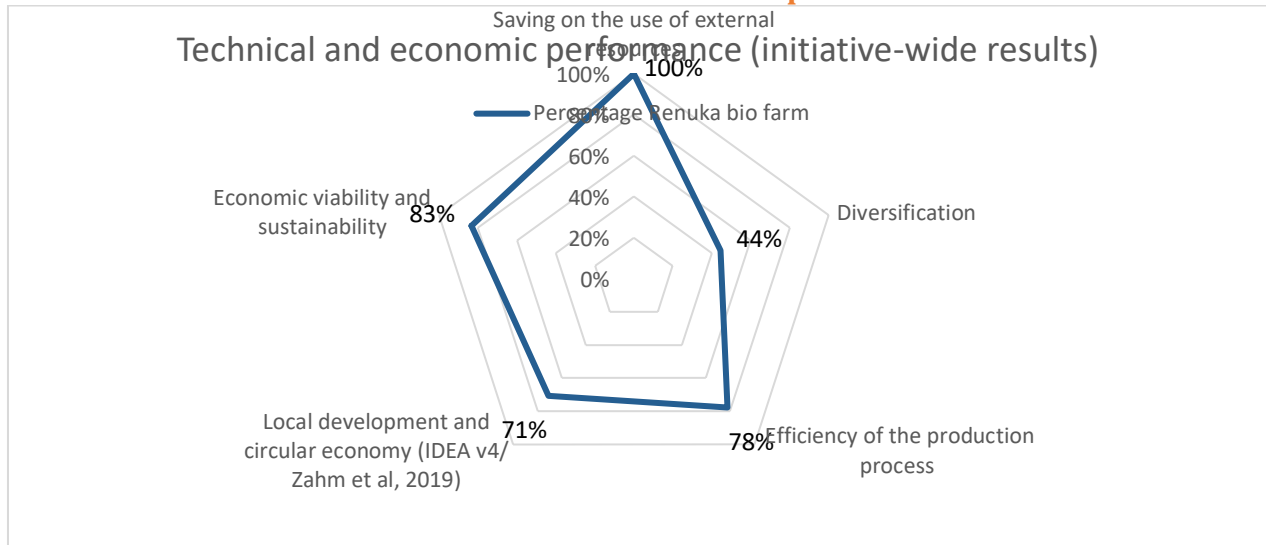
Agroecosystem health dimension



The initiative performs very well on the criterion of agroecosystem health (overall score of 76%). It has a maximum score (100%) on **animal welfare** and **limited use of pesticides**. Indeed, on the Renuka farm the feed requirements of the animals are met (organic fodder, no pesticides or chemical fertilisers). In addition, more than 80 cows of local breeds have been rescued from the slaughterhouse and taken into care. The farm does not use any chemical inputs to protect its crops. It uses various practices such as the use of pest-resistant varieties or the production of natural pesticides, such as the fungicide and pesticide "Go-arc", which also promotes plant growth. The cultivation of early and late varieties also gives excellent results. **The use of chemical fertilisers and the use of organic fertilisers** also perform well (score of 93%). Indeed, the fertilisers used are entirely organic: manure, neem kernel powder, Bio-Booster (a plant growth stimulator produced under the initiative), green manures, etc. Legumes are also included in the crop rotation cycle.

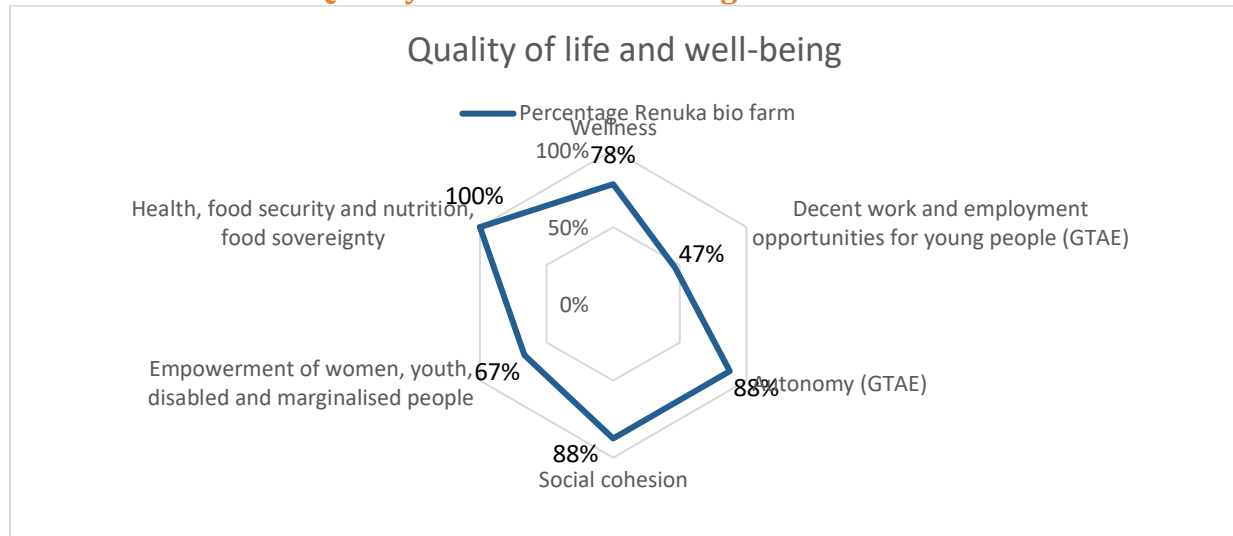
The other three dimensions studied show average scores. **Water use is** moderately efficient (56%) despite the establishment of a pond to conserve water. However, the initiative plans to install a drip irrigation system in each plot to increase water use efficiency. The initiative's performance on **maintaining soil health and biodiversity is average** (scores of 56% and 51% respectively) despite the fact that the farm uses no chemical inputs. Indeed, the farm is located in a very degraded environment due to the presence of industrial and mining activities. On the other hand, some plots are regularly ploughed, with the soil left bare for part of the year. However, the stability of the aggregates and the infiltration rate of the soils on the farm seem to indicate a good soil structure.

Dimension "Technical and economic performance



The initiative scores highly (75%) on the dimension of technical and economic performance. Indeed, **the economy of use of external resources** shows a maximum performance (100%), with a very low dependence of the farm on external inputs: no chemical fertilisers are used. Manure is produced on the farm as well as the "Bio-Booster" which improves plant growth. For pest control, the applied solution (Go-Arc) is also manufactured on site as well as the Neem stone powder, which is used as an organic antifungal and pest control fertiliser. The farm sells this powder to nearby farms. The farm is also completely self-sufficient in terms of feeding the livestock (fodder crops and pastures). The rate of self-consumption is average (54%), with part of the production consumed by the household (paddy, mango) and another part for livestock feed and input production. The farm only buys seeds (estimated expenditure 3,281 INR/ha/year). The **economic viability and stability of the farm** is high (score of 83%). The farm now depends very little on subsidies, but benefits from a free supply of electricity and the initiative's manager still has a long-term debt (which is less than 30% of annual turnover). The income is diversified: rental of agricultural equipment and organic farming consultancy of the initiative leader. The income generated by the farm is used to pay the farm employees. The **local development and circular economy** performance is 71%. Indeed, the farm produces quality food, without chemical inputs, for human and animal consumption. Economic opportunities have emerged, such as selling paddy with Srinergy, an Indian-American company (since 2021). Since 2018, with the help of the Stichting Vivia Foundation (Netherlands) and the University of California Davis, the initiative has received solar drying chambers, which are used to dry the harvested products in all crops. Finally, **diversity** has the lowest score (44%). Indeed, commercial diversity is low, with only one main customer (Srinergy) for the purchase of rice. The farm also has low income diversification. Indeed, more than 30% of the farm's turnover is generated by the sale of paddy alone and more than 30% by the sale of manure.

Quality of life and well-being" dimension

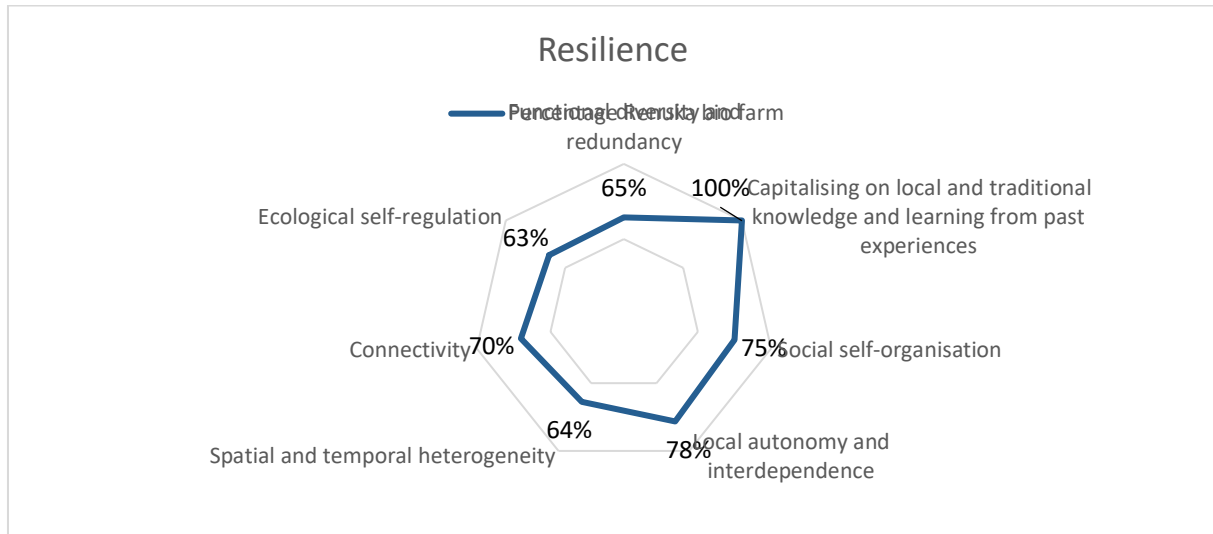


The initiative performs well in terms of quality of life and well-being, with good results in several criteria:

- **Health, food safety, nutrition and food sovereignty** (score of 100%) due to the diversity of the diet of the farm's employees (nine food groups). The food production is of high quality as it is free of chemical pesticides and the share of the area cultivated for food purposes is high (100%). The rate of self-consumption is high and the farm uses inputs mainly produced on site. The raw material for the production of neem kernel powder is purchased;
- **the autonomy** (88%) of the farm, especially in terms of inputs, which are mainly produced on site. In addition, employees participate in decision-making on agricultural operations and their knowledge is valued (on crop diseases and pests);
- **social cohesion** (88%) due to links with the local population and the sharing and exchange of tools. Employees participate in knowledge sharing programmes. On World Soil Day, a soil awareness and knowledge sharing programme was held on the farm.
- **The empowerment of women, youth, disabled and marginalised people** (67%) due to the fact that more than 75% of the initiative's employees are women (15 women in total). In addition, employees work only every other day to ensure fairness among employees and to provide employment opportunities for women. The women employees are involved in decisions about crops, livestock production, expenses, etc. The manager of the initiative is very attentive to the well-being of the employees. For example, when one of them got injured, he supported him financially. The employees are satisfied (the initiative's **welfare** score is 78%).

However, the initiative performs less well in terms of **decent work and employment opportunities for young people** (47%). Indeed, even if the working conditions are good (alternating working days, equitable distribution of tasks, formal contractualisation, salary paid every month), no young people are employed. Moreover, the remuneration of women is still lower than that of men, justified by the farm manager by the very arduous nature of the tasks entrusted to them.

Resilience dimension



With an overall score of 70%, the initiative has a strong impact on resilience. All criteria score above 63%. **The capitalisation of local and traditional knowledge and learning from past experiences** is excellent (100%). Indeed, platforms for co-creation and knowledge transfer have been set up within the community. The initiative provides spaces for sharing traditional knowledge and actively supports the agroecological transition with equal representation of men and women. Trainings are organised on the farm throughout the year for the employees. **Social self-organisation on the farm** is high (75%). Indeed, all farm work is done collectively by the employees. In contrast, only three of the 19 employees on the farm are part of professional structures. **Local autonomy and interdependence** are high (78%) for the same reasons as mentioned above (previous dimension).

The initiative performs well in terms of **connectivity** (70%) despite a low proportion of trees and hedges on the farm. However, agroforestry practices were introduced from 2022. The initiative has significant impacts on **functional diversity and redundancy** as well as **on spatial and temporal heterogeneity** (scores of 65% and 64% respectively). Indeed, for the first criterion, the products (raw or processed) marketed are not very diversified. Of all the agricultural crops, the initiative only markets paddy, sapodilla and mango. However, the initiative has various sources of water, with three ponds, as well as three sources of energy (solar energy, biogas, electricity). The initiative also allows its members to have access to diversified food, which contributes positively to the result of this criterion. For the second criterion, despite a high degree of temporal diversity, the farm does not produce stem, root or leaf vegetables. Furthermore, the area occupied by paddy represents at least 50% of the total UAA, which reduces spatial heterogeneity. In addition, the area of grassland is small on the farm. On the other hand, local breeds (sheep and cows) are raised, but they are neither rare nor endangered. Similarly, no rare or endangered varieties are cultivated except for about 20 endemic tree species planted in the farm's "heavenly garden".

Cross-sectional analysis

The two Indian initiatives aim to empower poor and marginalised rural people - who are heavily dependent on agriculture and livestock for their livelihoods - at two different scales: one is a farm (Renuka in Routhu Suramala in Chittoor district) and the other is a multi-village project in the agricultural districts of Banswara and Aandi (Vaagdhara). The means used to increase farmers' livelihoods are both the introduction of agroecological practices, processing of agricultural products and access to markets (marketing). Various **agroecological practices** have been introduced to intensify the farming systems of these initiatives: crop mixes, market gardening, agroforestry, integration of livestock, etc. The "Sustainable Integrated Production System" (SIPS) approach has been implemented by Vaagdhara. This is based on **participatory learning processes with farmers** to design models that are adapted to the local context, household needs and farmers' knowledge. Drip irrigation has also been introduced to improve the **availability of the water resource and the efficiency of its use**. The Renuka farm has also created ponds to better conserve this scarce resource during certain periods of the year. On this farm, post-harvest practices have been implemented, with the installation of solar dryers (using solar panels) to dry groundnuts, chillies, tomatoes, paddy, etc., for better conservation.

Conservation and restoration practices for degraded soils have been introduced, such as the WADI method of restoring degraded soils while cultivating them with vegetable crops in the Vaagdhara initiative. The same initiative has adopted the SALT (Sloping Agricultural Land Technology) approach for sloping land to progressively transform it into cultivated terraces, thanks to the installation of leguminous hedges on the contour lines. These practices have many positive impacts on the health of the agro-ecosystem, and in particular on the soil. In addition, **the exclusive use of bio-inputs** (mostly produced on the farm) to fertilise and protect crops in both initiatives has a positive impact on soil health. The production and use of their own organic fertilisers (compost, manure, green manure, etc.) allows the recycling of organic matter and contributes to the maintenance or improvement of the productive capacity of the soil. **Biological control methods** are used in both initiatives, such as the use of neem extract and fungal (*Trichoderma*) or bacterial (*Pseudomonas*) biological agents, late mowing, the introduction of hedges, the manufacture of natural pesticides, etc. Plants with insecticidal properties are also cultivated at the edge of the fields (case of the Renuka farm). In addition, the initiatives are self-sufficient in fodder, which is produced in whole or in part by the farms; the Renuka farm even cultivates some thirty fodder species! Only feed supplements can be purchased.

In addition to production, these two initiatives also seek to improve the **marketing of agricultural products and access to markets** for producers and *ultimately* improve the livelihoods of beneficiaries and their families. Thus, Vaagdhara is helping its members (mainly tribal families) to benefit from **the "fair trade" label** through the creation of the "Tribal Food and Grain Initiatives Producer Company Limited". In addition, a recent contract (signed in 2021) links the Renuka farm for the sale of paddy to Srinergy, an American-Indian company.

One of the main constraints identified is the **low literacy of the local population**, particularly within the Vaagdhara initiative. Indeed, the majority of the families involved in this initiative are tribal and have no access to formal education or most public

programmes. Therefore, **capacity building and knowledge sharing** are essential levers for the development of agroecology, with both initiatives providing training and experience sharing. Participatory learning approaches, involving farmers, experts and facilitators, help to design improved production systems adapted to local contexts, knowledge and skills, as well as to household needs and market opportunities (this is the case of Vaagdhara with the SPID approach). The Renuka farm has a room dedicated to training by the NGO GVS on agro-ecological practices, dryland farming, sustainable land management, etc. Producers wishing to engage in the agroecological transition can also visit this farm.

Women's empowerment is promoted by the Vaagdhara initiative through literacy training and micro-credit through self-help groups. These groups also provide opportunities for women to meet, express themselves and initiate social and economic improvements through small-scale activities. This informal lending system helps to meet urgent demands and consumption needs. Women are also assisted by the initiative to obtain loans from banks for their entrepreneurial activities. In addition, they now participate in decision-making within and outside their families. The farm labour force consists of 40% women and 90% tribal community members. Half of the employees on the Renuka farm are women. The wife of the owner of the farm was elected as the chairperson of the village council.

Another important lever for the development of agro-ecology is **solidarity and social cohesion** among community members, both of which are promoted by collective work and participation in networks or professional structures. For example, the members of the Vaagdhara initiative are part of the Saksham Samuh, a self-help group to carry out collective actions (loan of agricultural equipment, production assistance, etc.).

Finally, despite **the scepticism of some so-called "conventional" producers** towards agroecology and its performance, the Renuka organic farm now acts as an incubator for local farmers who wish to engage in the agroecological transition (capacity building and knowledge development on agroecological practices). Since its inception, the initiative has expanded to neighbouring farms and agroecological production systems have been implemented on 405 ha of restored land. The Vaagdhara initiative is now working with 444 families in six villages (in 2021) on an area of over 120 ha!

Sources

Reddy R., Pradeep P., 2021. Avaclim. Component-2. Report on Steps 1 to 3 of the Evaluation. Initiative: Vagdhaara, GBS, India. November-December 2021 (unreleased report).

Geay-Galitre M., Reddy R., Pradeep P., 2021. Avaclim. Component 2: Evaluation Report-Step 4. Initiative: Vaagdhaara, India, GBS, India. August 2021 (unreleased report).

Sanjeev K.C.J., 2021. Avaclim. Component-2. Report on Steps 1 to 3 of the Evaluation. Renuka Bio Farm, GBS, India. November-December 2021 (unreleased report).

Sanjeev K.C.J., Geay-Galitre M., Reddy R., 2021. Avaclim. Component 2: Evaluation Report-Step 4. Initiative: Renuka Bio Farm (RBF), GBS, India. March 2021 (unreleased report).



Contact:

Add an email address
agroecologie@cariassociation.org

www.avaclim.org

Date:??

Authors: If necessary

Photo credits: If necessary

