Review Article

A Review of Building Community Resilience for Stress Free Future Farming

ABSTRACT

Farming in India, despite numerous challenges, continues to play a pivotal role in feeding the nation's vast population. Recognizing the need for resilient agricultural practices to sustain the profession and secure the future of farming, explore the importance of adopting to change in the agricultural sector. The review highlights the current challenges faced by Indian agriculture, including climate change, diminishing natural resources, fragmented land holdings, lack of access to technology and information, and socio-economic disparities. These challenges pose significant threats to the sustainability and viability of farming, necessitating proactive measures to build resilience. To make farming stress-free and attractive for future generations, the review proposes various strategies and approaches that can enhance agricultural resilience. These include the adoption of climate-smart agricultural practices, such as conservation agriculture, precision farming, and agroforestry, to mitigate the adverse effects of climate change. Additionally, the promotion of sustainable water management techniques, efficient irrigation systems, and watershed management can address the issue of diminishing water resources. Recognizing the role of policy frameworks in fostering agricultural resilience, the paper underscores the need for government support in the form of favourable policies, subsidies, and incentives.

Keywords: Sustainability, Stress free farming, Resilient agriculture, Policy, Technology.

1. INTRODUCTION

Agriculture serves a crucial function in the socioeconomic development process. In India, agriculture is the primary source of income for approximately 58 per cent of the population, and agriculture is the sole source of income for approximately 70 percent of rural households. Approximately 20.19 per cent of India's gross domestic product (GDP) is contributed by the agriculture sector. Approximately 62 per cent of India's population depends on it for survival (1). Agriculture is a vital sector of the Indian economy, contributing approximately 20.19 percent of GDP in 2020-21 (DAC & FW annual report).

Early on in history, agriculture was conducted solely for domestic purposes; however, as new technologies and innovations were developed to increase crop yield, people began to earn a living from agriculture as well. In addition to environmental threats, however, a number of socioeconomic difficulties have emerged.

2. CONCERNS IN INDIAN AGRICULTURE

2.1 Small and fragmented land holdings

It's a metaphor for the way in which inheritance laws might cause landholdings to be divided up into economically infeasible pieces. The fundamental worry in modern agriculture is the shrinking amount of landholdings. Eighty-six percent of the agricultural sector is made up of small farms. Land ownership has decreased from 2.30 ha in the 1970s to 1.08 ha in 2015-2016. By 2030, the typical farm will cover just 0.32 hectares. The rules we have set up regarding inheritance are largely responsible for this sad state of things. All of the father's sons share equally in the farm's inheritance.

The sub-division and fragmentation of the holdings is a major contributor to our poor agricultural production and the underdeveloped state of our agriculture. Irrigation becomes more challenging on such tiny and fragmented fields, and it takes a lot of time and labour to move animals, equipment, manure, seeds, and other agricultural supplies from one piece of land to another. Setting up borders also results in the loss of a lot of good farm land. The farmer's attention would be diverted from fixing the problem (2).

2.2 Reduction yields

For thousands of years, farmers in India have been depleting their soils to cultivate crops. As a result, soils have been depleted and tired, leading to lower yields. Agricultural output per acre is somewhat low compared to other countries (3). Here are a few of the arguments in favour. Seed is a vital initial step in increasing crop yields and ensuring agriculture's long-term sustainability, but the distribution of ensured quality seeds is becoming a challenging challenge as its manufacture makes excellent seeds unaffordable for the vast majority of farmers. Factors such as insufficient nutrients and an uptick in the occurrence of pests and diseases contribute to decreased agricultural productivity (4).

2.3 Scarcity of capital

Like any other important sector, agriculture must have access to financial resources in order to thrive. The role of capital input in agriculture is growing as a result of technological advancements. The farmer needs to raise money to speed up agricultural output, but his money is already invested in his land and assets. Farmers often get financing from moneylenders, merchants, and commission brokers who, in exchange for a high interest rate, buy crops at a cheap price (5).

2.4 Irrigation

India is the world's second most irrigated country, yet it barely irrigates a third of its agricultural land. Irrigation is the most important agricultural input in India because of the country's tropical monsoon climate, which results in unpredictable, inconsistent, and intermittent rainfall. Indian agriculture cannot make significant progress until more than half of the cultivated land is brought under secured irrigation, as shown in the success stories of Punjab, Haryana, and the western portion of Uttar Pradesh. While canal irrigation is effective in increasing agricultural production across large areas, care must be taken to minimise the negative impacts of over-irrigation. Poor irrigation practises have left significant swaths of the Indian states of Punjab and Haryana useless (areas affected by salinity, alkalinity, and waterlogging) (6). Due to intense irrigation, subsurface water levels have risen dramatically in the command area of the Indira Gandhi canal, resulting in waterlogging, salt, and alkalinity of the soil (7).

2.5 Lack of mechanisation

While certain sectors of agriculture in the nation have become highly mechanised, the great majority of farming is still done by hand using traditional tools like wooden ploughs and sickles. This is especially true for the small and marginal farmers out there. It leads to a lot of wasted time and low productivity overall (8). There are several compelling arguments in favour of mechanising agriculture, including the need to reduce wasteful manual labour and boost productivity. The utilisation of agricultural gear and equipment allows for successive planting, which boosts yields across the board (9).

2.6 Soil erosion

Large areas of potentially fertile land are being degraded because of wind and water erosion. This region needs to be treated appropriately, and its fertility should be brought back to where it was before (10)

2.7 Inadequate extension personnel

About one extension service provider (ESP) for every 1,156 active agricultural units (11). A large chunk of the economy is dependent on small-scale farmers. In order to boost agricultural production and productivity, the extension system is expected to play a significant role. In developing countries, where the agricultural system is still characterised by a low level of agricultural service delivery practise that could not move the existing traditional agriculture into a mode to realise agricultural development, agricultural extension agents play a central role in providing extension services to farmers. Due to their central role in the extension service delivery system, extension agents are a vitally essential stakeholder (12). This is particularly true in underdeveloped countries, where a large percentage of farm families are illiterate and few other sources of financial aid are available. Farmers in developed countries may usually use information and communication technologies (cell phones, email, the internet, fax machines, etc.) to get instantaneous answers to their questions and expert advice. Since Ethiopia is not yet at this stage, extension agents will continue to play an important role

in the provision of agricultural extension service, in contrast to India and many other emerging countries (13).

2.8 Agricultural marketing

Poor agricultural marketing is a problem in India's rural communities. Due to a deficient distribution network, farmers often have to sell their excess crops at a loss to local merchants and middlemen. These farmers are typically forced into distress sales by external factors such as the economy and society. Most farmers in rural regions only have one customer: the local moneylender. The destitute farmer has no choice but to sell his crop for whatever price he can obtain in order to meet his mounting debt commitments. A study by Rural Credit found that farmers often deal with unfavourable circumstances while trying to sell their produce. Since there is no centralised structure for selling agricultural goods, the industry is controlled by independent merchants and intermediaries. When intermediaries are paid, the end consumer benefits more than the producer. According to studies of the market, middlemen often earn 48-60% of the retail price of staple foods including rice, groundnuts, and potatoes (14).

2.9 Climate change

The success of both farms and fisheries is highly reliant on the elements. Rising temperatures and higher amounts of carbon dioxide may enhance agricultural production in certain locations (CO_2). These benefits, however, may only be realised under certain conditions. These requirements include, but are not limited to, sufficient nutrient levels, soil moisture, water availability, and so on. More frequent and severe droughts and floods might threaten agricultural output and food security. Many fish and shellfish species have their ranges predicted to shift as a result of increased water temperatures. Climate change might make it more difficult to cultivate, raise cattle, and fish in the same ways and places as before. It is crucial to examine the repercussions of climate change alongside other elements like these, since the impact of rising temperatures on a given crop will vary according to its optimal temperature for growth and reproduction. Increasing CO_2 levels in the air may have a negative impact on crop yields. Overall quality has been connected to a decrease in protein and nitrogen content in alfalfa and soybean plants, which has been blamed on rising CO_2 levels. Reduced grain and forage quality may reduce the ability of pastures and rangelands to support grazing cattle. Increasingly severe weather may hamper agricultural growth.

2.10 Reduction of soil organic carbon

The organic carbon content of soil decreased to 0.3% from 1% - Ashok Dalwai, CEO, National Rainfed Area Authority (NRAA).

Reasons for reducing soil organic carbon

Increasing atmospheric temperature, extensive mining of soil fertility, Inappropriate tillage practices, poor crop management, intensive cultivation of crops without providing proper compost, indiscriminate use of fertilizers, soil erosion is one of the important factors

2.11 Environmental pollution

Consecutive fires eliminate the organic matter that makes soil fertile, reducing agricultural yields and raising the price of fertilizers. Also at danger are nearby neighbourhoods, buildings, and fields from the smoke and flames. Many times, the materials left behind after farming are useful and should be preserved. The procedure of burning the remaining straw following the harvest of grains (paddy, wheat, etc.) is known as stubble burning. The air quality is particularly poor in several regions of north India owing to the widespread practice of burning agricultural leftovers.

2.12 Loss of Biodiversity

If there is less biodiversity, then there will be more plants and animals that are susceptible to illnesses and parasites. The rising loss of biodiversity for food and agriculture puts food security and nutrition at danger. This concern is compounded by the fact that we are becoming dependent on a decreasing number of species to provide for our nutritional needs. One of the causes of the decline in biodiversity is the practice of monocropping (Orking & Clima 2008).

2.13 Lack of proper storage facilities

In most rural regions, there is either no provision for storing things at all or just a little amount available. In these kinds of circumstances, farmers are forced to sell their product right after it has been harvested at the rates that are currently being offered on the market, which are almost certainly going to be rather low. A sale of this kind deprives the farmers of the rightful money they deserve.

The post-harvest losses were assessed at 9.3% by the parse committee, with inadequate storage accounting for approximately 6.6% of the total. Therefore, scientific storage is very important for preventing losses, which is to the mutual advantage of farmers and consumers.

2.14 Inadequate transport

The high cost and low efficiency of transportation is a significant challenge for Indian farmers. There are still millions of rural areas without convenient access to major cities and economic centres. When it rains, the kutcha (bullock- cart roads) common in rural areas become inaccessible. Due to transportation issues, farmers may only sell their wares at a discount in their immediate vicinity rather than at the larger central market. It would be a massive task and expensive to build a paved road to every village.

2.15 Lack of institutional support

Despite changes brought about by nationalization in the way Indian farmers are supported, many small and marginal farmers still do not get the real help they need in the form of finance. The government dedicates a lot of programs specifically to the sector of agriculture, yet the majority of them do not benefit the local agricultural communities. Farmers will face several challenges and obstacles while completing the necessary paperwork and waiting for the bank to approve the loan amount, so they must rely on unofficial lending sources like money lenders that impose excessive interest rates. Farmers are compelled to conduct distress sales as a result of ongoing pressure from money lenders.

2.16 Farmers suicides

“The farmer is born in debt, live in debt, dies in debt” – sir Malcolm darling. The widening gap between farm expenses and harvest profits has made farming unprofitable. One of the main causes of farmer suicides has been identified as being trapped in a never-ending cycle of debt. 12 per cent of all suicides in India are committed by farmers . Over the course of the last several years, farmers have experienced an increasing number of difficulties, leading to elevated stress levels. Farmers have had a hard time securing loans and other forms of financial aid due to the persistently low pricing. Food security issues arise when farmers are forced to abandon agriculture as a result of natural disasters and economic uncertainties. In addition, there is scientific evidence that chronic stress impairs cognitive abilities including planning and communication. This often results in farmers making bad decisions or shutting down of farming. So, there is a need to address the stress-free future farming to retain the farmers in farming by helping them to make profits from agriculture so that the future generations will see it as remunerative enterprise and sustain the agriculture.

Table-1: State/UT –wise details of Farmers suicides (2014 to 2018) (16).

S. No	State/UT	2014	2015	2016	2017	2018
1	Andhra Pradesh	160	516	239	375	365
2	Arunachal Pradesh	0	7	6	0	0
3	Assam	21	84	6	3	5
4	Bihar	0	0	0	0	0
5	Chhattisgarh	443	854	585	285	182
6	Goa	0	0	0	0	0
7	Gujarat	45	57	30	4	21
8	Haryana	14	28	0	0	0
9	Himachal Pradesh	32	0	0	4	5
10	Jammu & Kashmir	12	0	0	0	5
11	Jharkhand	0	0	3	0	0
12	Karnataka	321	1197	1212	1157	1,365
13	Kerala	107	3	23	42	25

14	Madhya Pradesh	826	581	599	429	303
15	Maharashtra	2,568	3,030	2,550	2,426	2,239
16	Manipur	0	1	1	0	2
17	Meghalaya	0	2	2	0	0
18	Mizoram	0	0	0	0	17
19	Nagaland	0	0	0	0	0
20	Odisha	5	23	20	0	0
21	Punjab	24	100	232	243	229
22	Rajasthan	0	3	4	3	2
23	Sikkim	35	15	12	7	1
24	Tamil Nadu	68	2	36	19	6
25	Telangana	898	1,358	632	846	900
26	Tripura	0	1	4	0	0
27	Uttar Pradesh	63	145	69	110	80
28	Uttarakhand	0	0	0	0	0
29	West Bengal	0	0	0	0	0
30	A & N Islands	8	0	3	2	4
31	Chandigarh	0	0	0	0	
32	D & N Haveli	0	0	0	0	7
33	Daman & Diu	0	0	0	0	0
34	Delhi	0	0	0	0	0
35	Lakshadweep	0	0	0	0	0
36	Puducherry	0	0	2	0	0
	Total (All India)	5,650	8,007	6,270	5,955	5,763

3. STRESS FREE FARMING

The goal of stress-free farming is to find ways to overcome obstacles in the agricultural industry so that new possibilities may be made, aiding in the production of food that is sustainable. It also explains the need of mental freedom for farmers so they can make sound choices for their farms and maintain good health. There are various ways to make the future farming stress free but building community resilience is one of the most important ways in the present days farming.

4. COMMUNITY RESILIENCE

Community resilience is the ability of communities to withstand, adapt to, and recover from adversity. Resilience is important because it gives people the strength needed to process and overcome hardship.

“Resilience” is a term and concept that is generally understood as the ability to recover from a disorder. Resilience in agriculture means being able to recuperate from shocks and negative impacts - climate change, such as severe droughts, rainfall variations, extreme temperature. For small holder farmers, these shocks can exhaust scare resources of cash seeds and livestock (17).

Community resilience refers to the ability of community members to take meaningful, deliberate, and collective action to remedy the impact of a problem, including the ability to interpret the environment, intervene, and move on. Resilience is conceptually related to sustainability by involving people, social systems, and institutions that are resistant to disturbance. Community resilience also refers to the process that links adaptability after disruption. Thus, community resilience is internally related to community welfare, in relation to quality of life or community function (17).

5. DIMENSION OF COMMUNITY RESILIENCE

The farming community resilience (FCR) model is discussed, and the figure shows the indications for each dimension. In this work, a new multi-item scale and indicator for evaluating FCR, which is built using a standard scale development procedure based on the approach provided by Tukur. Items from the FCR literature that have previously been utilized in this procedure are included. The selection of FCR components is based on the community, agricultural, individual, and household contexts (18).

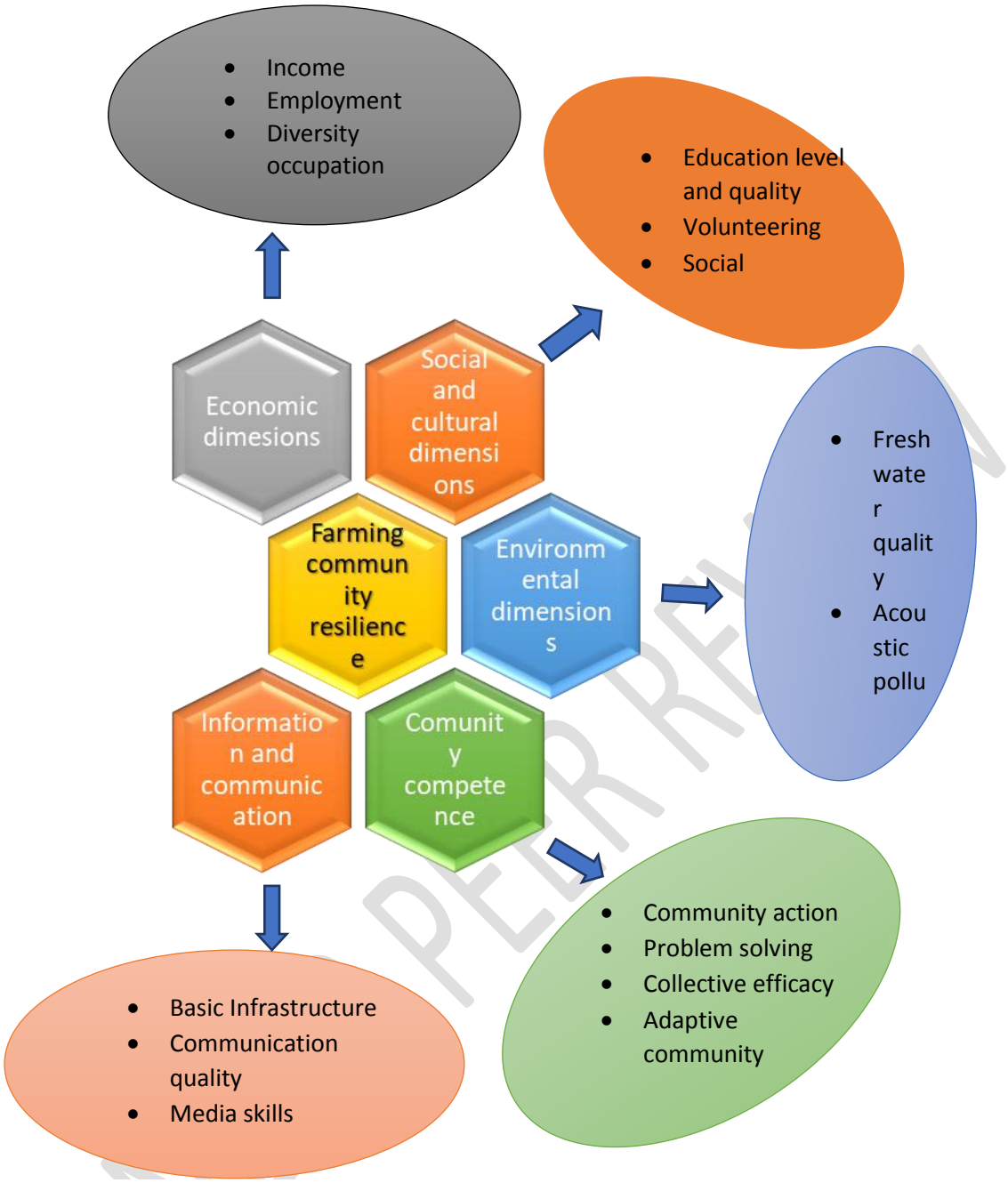


Fig-1: Different dimensions of community resilience

5.1 How to build community resilience

In in order to build resilient communities through the following strategic objectives

5.1.1 Identify the problem: the main problem that the farming community is facing has to be identified by analysing the situation.

5.1.2 Understanding the causes and effects: understanding of what is happened and what is the problem is very important.

5.1.3 Build capacity: build and improve knowledge, skills and resources that are valuable before, during and after an emergency event. Capacity building is the process of developing and strengthening knowledge and skills that aid in the preparation for, response to and recovery from an emergency event. The team will provide the opportunities and tools to facilitate activities that improve communities' ability to anticipate risk, limit impact, and bounce back rapidly after an emergency event.

5.1.4 Increase connectedness: support activities that create and strengthen relationships throughout diverse communities that build social capital. Increasing connectedness is the process of creating and strengthening relationships between individuals and organisations that result in stronger communities. The resilience team will support, but not lead, traditional, nonemergency related community development activities that improve social capita.

5.1.5 Foster cooperation: lead activities that foster trust, reciprocity and interdependence by facilitating opportunities to improve resilience. Fostering cooperation is the process of bringing diverse individuals, organisations and communities together for a common emergency-related purpose. The resilience team will work with stakeholders to create and/or facilitate outcomes that improve social capital and aid in the preparation for, response to and recovery from an emergency event.

5.2 Ways to promote community resilience

5.2.1 Land consolidation: Reallocation of holdings which are fragmented and creation of farms which comprises only one in place of multitude of patches. Implemented only in Punjab, Haryana, and some parts of Uttara Pradesh.

5.2.2 Cooperative farming: Farmers voluntarily joined together by pooling their resources and sharing of profits among members.

5.2.3 Integrated Farming System approaches: Combination of different enterprises for minimizing the loss and maximizing the profits through the reuse of waste produced on farm

5.2.4 Integrated Pest Management practices: By combining methods including biological control, habitat management, alterations to cultural practises, and the adoption of resistant cultivars, Integrated Pest Management is an ecosystem-based approach with an emphasis on long-term avoidance of pests or their harm.

Objectives

Soil quality improvement, increase efficiency of all nutrient sources, reduce pollution and environmental risk, increase profit, fertilizer best management practices.

5.2.4 Promoting organic farming: It emphasizes the use of natural methods and has the potential to improve soil fertility, biodiversity and sustainability of agricultural production. It makes yields more stable, achieve better food quality and food security and provides access to attractive markets. But it should be gradual than sudden.

5.2.5 Precision agriculture: It's a way of running a farm where data analysis is used to provide plants and soils precisely what they need to thrive and produce at their highest levels. It's farming

that's tailored to the land where it's grown. Using tools like global positioning system (GPS), smart sensors, and geographic information systems (GIS), we want to safeguard the environment while also increasing profits.

5.2.6 Climate smart agriculture: Cropland, livestock, forests, and fisheries are all managed as part of climate-smart agriculture (CSA), a strategy that takes on the interconnected problems of food insecurity and climate change.

5.2.7 Subsidies and incentives: Providing these for mobilizing the farmers in building community resilience in farming.

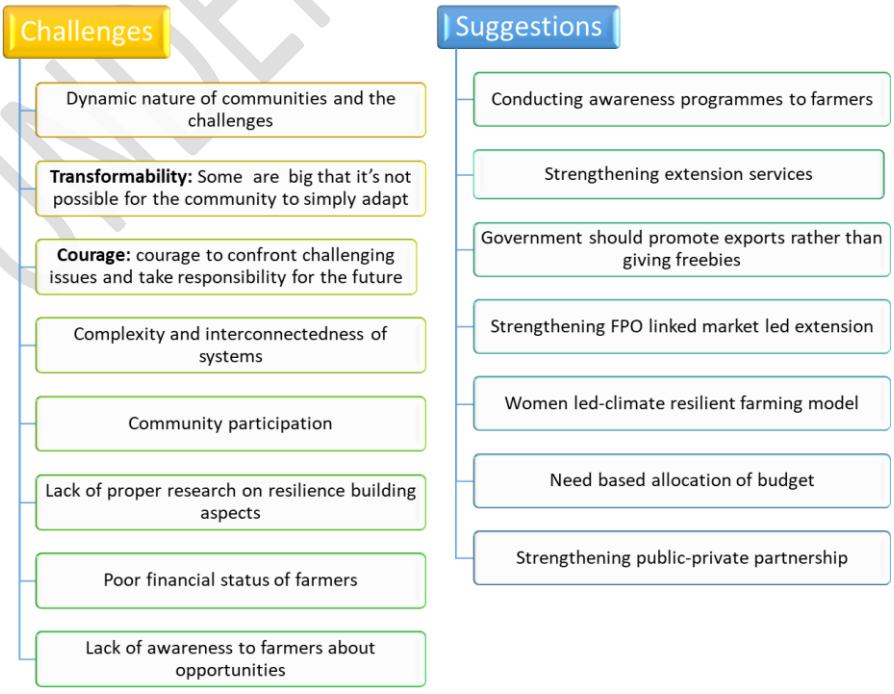
5.2.8 Farmer producer organizations: Primary producers' group, consisting of farmers and others who contribute to the creation of a product or service (an agricultural produce or a manufactured product). Therefore, it may serve as a hub for people to have easier access to benefits like PDS, MGNREGA, scholarships, pensions, etc., provided by the government. The primary objective is to help farmers and ranchers improve their financial standing by forming their own cooperatives. The inputs it provides to its members will be of high quality and cheap cost.

5.2.9 Self-help groups:

It brings together people who have common issues, need and often used as an empowered tool for socially marginalized groups.

5.2.10 Active involvement of Non-government Organizations: A Non-governmental organization (NGO) is an organization independent of the government whose primary mission is not commercial and that focuses on social, cultural, environmental, educational, and other issues.

Fig. 2 Challenges In Building Community Resilience



6.0 GOVERNMENT INITIATIVES IN BUILDING COMMUNITY RESILIENCE

Different schemes responsible for building community resilience are, National Innovation on Climate Resilient Agriculture (NICRA), National Mission for Sustainable Agriculture (NMSA), Pradhan Mantri Krishi Sinchai Yojana (PMKSY), Paramparagat Krishi Vikas Yojana (PKVY), Pradhan Mantri Fasal Bima Yojana (PMFBY), Soil Health Card scheme, Gramin Bhandaran Yojana, National Agriculture Market (eNAM), Livestock Insurance scheme.

7.0 CONCLUSION

Farming India is facing many challenges still it is feeding the nation. so, there is a need to build resilience to make the future farming stress free so that future generations will also take it as a profession and will sustain the farming. It is not the strongest of the species that survives, nor the most intelligent survives. It is the one that is most adaptable to change.

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