

Allied Occupations of Coastal Farmers in Tamilnadu: A case study

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Abstract

This case study aimed to explore the types of allied occupations adopted by farmers and their potential to support livelihoods based on knowledge shared by farmers in twelve coastal districts of Tamil Nadu, India. Using in-depth interviews, the study collected thirty case studies over eight months, with primary data analyzed using qualitative methods including demographics, socioeconomic, financial, environmental, and allied occupations as variables. The study is centred around two main areas, namely non-agricultural and agriculture-based allied occupations. According to the research, there was a prevalence of individuals who acquired new skills and became self-sustaining entrepreneurs, running independent businesses and creating employment opportunities to support their livelihoods. Agriculture-based allied occupations, such as dairy, goat, and poultry farming, were found to be prevalent, as well as organic farming and crop diversity. However, the study identified challenges faced by farmers due to climate change, particularly during rainy seasons, which negatively impacted the health of their cattle and poultry. Furthermore, the study found that awareness about organic farming among coastal farmers was relatively low, despite its many benefits.

The study recommends the promotion of organic farming and crop diversity as sustainable practices that can support the livelihoods of farmers while also promoting environmental conservation. These practices can also be easily learned by the common man, and through agriculture-based allied occupations, entire households can contribute and attain sustainable benefits.

Keywords: allied activities, coastal area, livestock, crop diversity, Organic farming, Success stories

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I. Introduction:

Agriculture is the foremost ancient and essential occupation of human beings. In India, a large number of population is employed in agriculture and related occupations¹. In Tamil Nadu, which is surrounded by three major seas, agriculture is the major livelihood for rural people who are less endowed². Additionally, fisheries play a significant role in providing employment opportunities and maintaining food security along the coastline, which makes up 15% of India's total coastline area³. However, farmers in coastal areas face challenges such as natural disasters, climate change, soil degradation, and government policies that affect their livelihoods drastically⁴. The overuse of chemical-based fertilisers, manures, and pesticides has led to the loss of fertility in agricultural land,

¹ Jayanta Sen, "Growth and Distribution Effects of Changes in Levels of Living in Rural India: A Decomposition Analysis," *Indian Journal of Human Development* 14, no. 3 (2020): 407–23, <https://doi.org/10.1177/0973703020967904>.

² Government of Tamilnadu, "DATABASE ON COASTAL INFORMATION Prepared by Report Submitted To," *Ocean Management*, no. January (2008).

³ V. Lauria et al., "Corrigendum to Importance of Fisheries for Food Security across Three Climate Change Vulnerable Deltas Science of the Total Environment 640–641 (2018) 1566–1577 (Science of the Total Environment (2018) 640–641 (1566–1577), (S0048969718320734) (10.1016/j.S," *Science of the Total Environment* 644 (2018): 1650, <https://doi.org/10.1016/j.scitotenv.2018.07.209>.

⁴ Sushma Guleria and J K Patterson Edward, "Coastal Community Resilience: Analysis of Resilient Elements in 3 Districts of Tamil Nadu State, India," *Journal of Coastal Conservation* 16, no. 1 (2012): 101–10, <https://doi.org/10.1007/s11852-011-0178-8>.

resulting in many farmers and landowners selling their land to real estate companies⁵. To combat these challenges, resilience is key. Groundwater usage for agriculture is common, but the salt content of coastal groundwater can adversely affect crops⁶. Therefore, non-farm income activities along with agriculture could be beneficial for farmers to have a sustainable livelihood. Our case study aims to find allied occupations that can support farmers' livelihoods based on the knowledge shared by successful entrepreneurs and farmers-turned-entrepreneurs. We also aim to create awareness about skill development based on personal capabilities and discuss the challenges in those allied occupations and how to overcome them."

II. Coastal Districts of Tamil Nadu Vulnerable to Climate Change

Climate change is a pressing issue that has put the livelihood of farmers in coastal districts of Tamil Nadu at risk⁷. The traditional reliance on the rainy season to irrigate agriculture fields is no longer reliable due to changes in weather patterns. Unpredictable depressions in the sea that bring heavy rainfall can quickly turn into storms or cyclones, causing extensive damage to farmland and local livelihoods⁸.

A study published in January 2016 in the International Journal of Global Warming assessed the vulnerability and adaptation potential of sustainable development sectors in the coastal districts of Tamil Nadu. The study used an index-based vulnerability assessment to evaluate the groundwater, agriculture, and fishery sectors⁹. The research found varying levels of vulnerability across different sectors in each district, with Villupuram and Thanjavur districts showing high vulnerability in the groundwater sector and Thoothukudi and Villupuram districts showing high vulnerability in the agriculture sector. The overall assessment concluded that among the 13 coastal districts, Thoothukudi and Villupuram districts required urgent attention and intervention to address their high vulnerability.¹⁰

III. Research methodology:

The research methodology involved conducting a study in twelve coastal districts including Thiruvallur, Kanchipuram, Villupuram, Cuddalore, Thiruvallur, Nagapattinam, Thanjavur, Pudukottai, Ramanathapuram, Thoothukudi, Tirunelveli, Kanyakumari of Tamil Nadu, India, where thirty case studies were collected from rural smallholder farmers through in-depth interviews over eight months (from October 2020 to May 2021). The primary data collected and analysed using qualitative methods focusing on the following themes (i)Types of allied occupation (ii)Sustainability in income(iii)Supportiveness to primary occupation (iv)Increased capacity level (v)Credit and financing (vi)Challenges faced (vii) success stories and other related matters. The study also addressed the challenges faced by farmers doing Non agriculture and agriculture based allied occupations.

IV. Successful Non agriculture allied occupations and their challenges:

A farmer from Vippeedu village in Kanjipuram district is involved in cement-based slab and gravel stonework. He produces ready-made Kambam and gravel stones for plots. He started his business in his village and has been running it for 10 years. The required area for this business is 7.5 cents, and since his family works with him, he doesn't need any labourers. He promotes his business by distributing business cards and word of mouth. Although rainy days pose a challenge for him, it does not impact his livelihood.

Brick-making is also a common business among farmers, where they make, bake, and sell bricks. They either own or work in a brickyard. The red brick-making business is also one that helps rural people sustain their livelihoods.

An interview was conducted with a farmer from the Kanjipuram district who shed some light on his business ventures. He has been involved in agriculture for 20 years but is relatively new to brick-making, having started only a year ago. He received a gold loan of about 2 lakhs from the bank to invest in the brick-making

⁵ Nikita Bisht and Puneet Singh Chauhan, "Excessive and Disproportionate Use of Chemicals Cause Soil Contamination and Nutritional Stress," ed. Marcelo L Larramendy and Sonia Soloneski (Rijeka: IntechOpen, 2020), Ch. 6, <https://doi.org/10.5772/intechopen.94593>.

⁶ Pichu Rengasamy, "Soil Processes Affecting Crop Production in Salt-Affected Soils," *Functional Plant Biology* 37, no. 7 (2010): 613–20, <https://doi.org/10.1071/FP09249>.

⁷ Sanjit Maiti et al., "Assessment of Social Vulnerability to Climate Change in the Eastern Coast of India," *Climatic Change* 131, no. 2 (2015): 287–306, <https://doi.org/10.1007/s10584-015-1379-1>.

⁸ P Dhanya, A Ramachandran, and K Palanivelu, "Understanding the Local Perception, Adaptation to Climate Change and Resilience Planning Among the Farmers of Semi-Arid Tracks of South India," *Agricultural Research* 11, no. 2 (2022): 291–308, <https://doi.org/10.1007/s40003-021-00560-0>.

⁹ P Radhapriya et al., "Vulnerability and Adaptation Assessment a Way Forward for Sustainable Sectoral Development in the Purview of Climate Variability and Change : Insights from the Coast of Tamil Nadu , India A . Ramachandran *, Dhanya Praveen ,," 10 (2016).

¹⁰ Radhapriya et al.

business. It costs Rs. 200,000 to make 50,000 bricks, with a profit of approximately Rs. 40,000. However, finding enough labourers is a challenge for this business.

Packaged drinking water and mineral water supplies are profitable businesses in today's market. A farmer from KanjiPuram runs a packaged drinking water company and received a government subsidy to start it. He has been in the business for 20 years, requiring an investment of Rs. 50,000 per month and earning a profit of Rs. 50,000. He needs an area of 20 cents for the business and advertises mainly through word of mouth and notices. The main challenges are labour availability and investment.

Restaurants are a common business in both small and big cities, and their profitability depends on factors such as location, investment, and quality. A restaurant owner in the Tirunelveli district has been running his restaurant for 22 years, starting in 1997 after receiving two years of training. The area required for a small restaurant is 10 cents, and the investment came from his own funds and family assistance. Business growth depends on delivering quality and quantity, and finance plays a vital role in expanding it. Patience is also required to succeed in this business.

A samosa seller who sells 500 samosas per day was interviewed. He has been in this business for 32 years, and quality is the main aspect of running it. He learned the business by working for another samosa seller and only requires an area of 10x10 sq ft.

A young entrepreneur in the Thiruvallur district sells cattle and bird feed in the daily market at wholesale prices. He is 22 years old and has been in the business for three years. He received a bank loan of Rs. 100,000 from the Indian Overseas Bank, which served as his initial investment. His strategy for expanding the business includes managing and maintaining fair prices, free delivery services for local areas, and a minimum charge for long-distance deliveries. The challenge in this business is the fluctuating prices in the market, which affect daily profits. Additionally, rainy seasons can cause problems due to the need for dry and cool storage for the feed.

In the Tuticorin district, some allied occupations for farmers include running travel vans and cars for rent. The area required for this business is flexible, as vehicles can be parked anywhere on the roadside. Farmers often switch between agriculture during the rainy season and transportation during the summer, with profits ranging from 5% to 10%.

A farmer in the Thiruvallur district earns a living by doing electrical work, plumbing, and welding. He started his own business at the age of 21 after serving as an apprentice and has been doing it for 30 years. This business does not require much space, but a hike in fuel prices could affect its profitability.

During our interview in the Tanjore district, we spoke with a farmer who also works as a tractor mechanic. He rents out tractors for rice planting and ploughing and has repaired around 450 to 500 tractors in his 15 years of experience. Occasionally, he travels to other states to work. He has even influenced a few people to start their tractor repair businesses, with two people successfully starting in the same field. His primary income comes from agriculture, but he also earns money by repairing tractors.

In addition, we had the opportunity to interview a commission agent shop owner who works in the agriculture sector. Commission agents procure agricultural produce from farmers and sell it in the market for small businesses. They are essentially traders, with prices fixed by higher officials that fluctuate according to market situations. In this area, one sack of produce typically costs Rs.20.

In Nagapattinam, we met a carpenter who owns agricultural land where he cultivates rice, Bengal split dal and legumes. He receives government subsidies for his farming, and also makes furniture and does interior woodwork for houses and window frames. This has been a family business for a long time, and the carpenter started working in it when he was just 17 years old. Competition is managed through experience and talent.

Some farmers in Nagapattinam have converted small parts of their agricultural land into prawn farms. One farmer in Pahmaramapuram has been doing this for 20 years since he was 40 years old. He learned about prawn farming from nearby farmers and invested in the business through government subsidies. However, the business has become less profitable in recent years due to competition from marine prawns and shrimp, and challenges such as viral and vellaikai diseases and seasonal variations.

In the Kanjipuram district, we met a silk weaver who also owns agricultural land. This has been an occupation for 20 years. He uses traditional wooden looms to make sarees, which take 8 to 9 days to complete depending on the design and work required. He works for a wholesale dealer, who provides him with the necessary materials and pays for his labour. Rainy seasons can affect his occupation.

Finally, in the Kanyakumari district, we interviewed a fish exporter and seller who also owns mango and plantain farms. He started his fish export and sales during the first wave of the Covid-19 pandemic, with no prior training, and has been in business for a year and a half. He operates out of an 800-square-foot space and uses strategies such as visiting different districts to negotiate fish exports. He has had a 45% success rate with his proposals and hopes to open another outlet, working towards this goal.

These allied occupations face challenges such as labour shortages, availability of red soil, saltwater, and rainy days. The success of these businesses depends on factors such as location, investment, quality, quantity, and finance. However, with patience and the right strategy, these businesses can be profitable and help sustain the farmers' livelihood.

V. Successful Agriculture based Allied Occupations and their challenges:

Here are some success stories of farmers who have diversified their occupations. These farmers are self-sustainable and provide employment opportunities to others, supporting their livelihoods.

DIARY, GOAT, AND POULTRY FARMS: These types of farms are prevalent among both coastal and non-coastal farmers. For example, a farmer from Passuvanathanai in the Thoothukudi district has been running a dairy farm for almost 14 years. He started with just two cows, which he mated and sold their calves. He reinvested his profits from this business and used the funds to expand it. He faced challenges, such as the impact of climate change on his dairy farm, which can cause a drop in milk sales from October to January, and rainy seasons affecting the agriculture and milk business. Another farmer from the Thiruvarur district runs a butcher shop selling cattle and poultry. Similarly, another farmer from the same district has been a butcher for 20 years, raising 100 goats and 80 chickens, including fighter roosters and country chickens. He also faces challenges during climate change, especially during rainy seasons when his cattle can get sick with leg and mouth diseases, and many chickens die if not given proper care. An IT employee from an agricultural family runs a dairy farm in the Tiruvallur district. He started this business three years ago, inspired by the essential product of milk and the fact that a well-managed dairy farm never runs a loss. His family has prior experience in dairy farming, but they stopped for 30 years, and now he uses desi cows and three H1 cows to produce milk. He believes that this business can be expanded by manufacturing dairy products and fodder for sales. A farmer from the Cuddalore district who has run a dairy farm for eight years believes that making jaggery by setting up a mini-crusher is very profitable in the area. He also has a fish pond that he started by buying small fries and breeding them to sell.

ORGANIC FARMING & CROP DIVERSITY: Organic farming has been practised since ancient times, where farming is done in a way that benefits the soil and the people consuming it. The waste from crops, animals, and aquatic sources is used as manure, fertilizers, and pesticides. The main idea behind organic farming is to conserve and preserve wildlife and our natural habitat. Organic products are often priced high in city or town markets, and there is less awareness about them among farmers in coastal areas. However, there is a success story from Poondi Madha Kovil in Tanjore district, where a farmer does organic farming and also runs cattle and dairy farms. He sells his products by increasing their value, converting desi cow bio waste into Vibhuti, arakku, soap, etc. He uses panchagavya as fertilizer, which consists of nine products, including cow dung, cow urine, milk, curd, jaggery, ghee, banana, tender coconut, and water. He prepares the panchagavya solution and sells it to other farmers at a reasonable price. The farmer started this organic farming in 2011, attending a campaign run by Pasumai Vikatan. Through the friends he met during the campaign, he gained enough knowledge to start this farming. The farmers who do organic farming have formed a group and help each other. They do not cultivate the same crop to avoid stagnation in production and instead grow different crops to make marketing easier. The initial investment is through bank loans and self-help groups. Marketing is done through word of mouth. The main challenge that organic farmers face is unpredictable climate change.

Nursery gardening is another allied occupation that farmers engage in to manage their livelihoods. The main investment required for this business is in the shed and soil. Finding a good dealer who sells plants at a reasonable local price is a boon for the business. The location also matters for strong customer and cash inflow. Freshwater is crucial for this business as salt water affects plants. An owner of a nursery garden from the Velankaani highway was interviewed to obtain information. A young nursery owner who is an MSc. Agriculture student was interviewed at Virudachalam, and he has been running this business for two years. His garden consists of cashew saplings and garden plants, and the required area for his business is 40 cents. He invested in the business using a gold loan. The challenges he faces are labour shortage and the availability of red soil.

A farmer hailing from Passuvanathanai in the Tuticorin district cultivates navadhanya, including black sesame seeds, Bengal farm, horse farm, green farm, rice, white beans, chickpeas, black gram, and wheat, while also keeping cattle. With 14 years of experience, he has learned through years of cultivation and is willing to train and influence other farmers. Using a combine harvester machine for three months (January, February, and March), he sells the harvested produce for the next nine months and requires a godown of 1000 sq. ft to store the produce. He sustains his livelihood by changing work among agriculture, navadhanya, and cattle farm. While he is well-prepared for the seasons, his challenge lies in the need for labourers. Therefore, he proves that diversifying the occupation by adding one or more allied occupations helps sustain a livelihood, especially in agriculture.

In another interview, the owner of a rubber-related small-scale industry in Kanyakumari shared valuable ideas about the industry and its business. The major work is to dry the rubber sheets and sell them, and he was interested in this business due to the abundance of rubber trees in his area. With the help of field officers from the Rubber Board of Central Government, he learned the procedure to manufacture rubber sheets, and he has been doing this for 30 years since he was 30. The area required is a minimum of 25 cents, and the investment is through a bank loan. Although he does not receive any government subsidy, he earns a moderate profit through this business. He also introduced a trolley system to reduce heat exposure from smoke rooms, which was recognized by the rubber board and published in a magazine. He is currently working on a project that uses dry air to dry

rubber sheets. The business runs well in the three months of November, December, and January, but the rainy season affects production. Nevertheless, the rainy season is also necessary for the trees to grow.

VI. Discussion:

These success stories demonstrate how farmers in Tamil Nadu have diversified their farming practices and have been successful in making a sustainable livelihood for themselves and their communities. They have shown resilience in the face of challenges such as climate change and unpredictable weather. The stories of these farmers could inspire other farmers in the region and elsewhere to consider adopting similar methods to improve their livelihoods.

They have adopted various allied occupations like dairy farming, goat and poultry farming, organic farming, and crop diversity to make a sustainable livelihood for themselves and provide employment opportunities for others. These farmers have faced many challenges due to climate change and unpredictable weather, such as decreased milk production, sick cattle, and diseased chickens. Organic farming and crop diversity were also discussed as alternative methods for farming. This finding is supported by the studies conducted by¹¹ and ¹²The benefits of organic farming were shared, including the preservation of wildlife and natural habitat. Organic farmers cultivate various crops, and their marketing becomes easier. The study found that organic farming can improve soil fertility, reduce production costs, and increase crop diversity. The study also suggested that organic farming can help in the conservation of natural resources and biodiversity. The success story of the organic farmer in Poondi Madha Kovil in the Tanjore district is consistent with the findings of this study.

These farmers share their knowledge and help each other. The study conducted by the Food and Agriculture Organization of the United Nations ¹³ has supported this idea. They face unpredictable climate change as a challenge. The importance of polyculture or crop diversity was also emphasized as it can help in sustaining livelihoods. The success stories conclude by recommending organic farming and crop diversity alongside conventional farming. These findings are supported by the study on Organic farming and the sustainability of agricultural systems ¹⁴.

According to a study by¹⁵, allied occupations like dairy farming and poultry farming can provide an additional source of income for farmers and can help in sustaining livelihoods. The study also highlighted the challenges faced by farmers in these allied occupations, such as disease outbreaks, lack of marketing support, and insufficient credit. The current text also discussed similar challenges.

In conclusion, the success stories of farmers in Tamil Nadu who have adopted allied occupations and diversified their farming practices demonstrate the potential for improving livelihoods through sustainable agriculture. The stories highlight the challenges and opportunities in farming in the region and could inspire others to adopt similar practices. The importance of organic farming and crop diversity for sustainable agriculture was also emphasized, which is consistent with previous studies on farming practices in Tamil Nadu.

VII. Conclusion:

In conclusion, the above-mentioned success stories of farmers who have diversified their occupations show that adding one or more allied occupations to traditional agriculture can sustain a livelihood. To diversify their income streams, farmers have adopted a range of non-farming allied occupations and farming-based allied occupations. While non-farming allied occupations are individual-specific and depend heavily on the skills and abilities of the individual, farming-based allied occupations can be household-specific, sustainable, and participated in by all members of the family.

Non-farming allied occupations are those that are not directly related to agricultural activities. These included cement-based slab and gravel stonework, brick-making, packaged drinking water and mineral water supplies, restaurants, samosa selling, cattle and bird feed, travel vans and cars for rent, electrical work, plumbing

¹¹ H Pathak, N Jain, and A Bhatia, "Enhancing Resilience of Indian Agriculture to Climate Change.," *Special Issue: Natural Resource Management*, 11, no. 4 (2015): 102–15, <https://www.researchgate.net/publication/311144262%0Ahttp://www.faidelhi.org>.

¹² Krishna Viswanatha Reddy et al., "Farmers' Perception and Efficacy of Adaptation Decisions to Climate Change," *Agronomy* 12, no. 5 (2022), <https://doi.org/10.3390/agronomy12051023>.

¹³ FAO, "Sustainable Development Department BUILDING RESILIENCE FOR AN UNPREDICTABLE FUTURE : HOW ORGANIC AGRICULTURE CAN HELP by Sarah Borron Food and Agriculture Organization of the United Nations Rome , August 2006," no. August (2006): 1–25.

¹⁴ D. Rigby and D. Cáceres, "Organic Farming and the Sustainability of Agricultural Systems," *Agricultural Systems* 68, no. 1 (2001): 21–40, [https://doi.org/10.1016/S0308-521X\(00\)00060-3](https://doi.org/10.1016/S0308-521X(00)00060-3).

¹⁵ K. Harishankar et al., "Determinants of Income Diversification among Dairy Farm Households in Tamil Nadu," *Asian Journal of Agricultural Extension, Economics & Sociology* 40, no. 6 (2022): 109–15, <https://doi.org/10.9734/ajaees/2022/v40i630909>.

and welding, tractor repair, commission agent shops, carpentry. In these types of occupations, the individual's skills and abilities play a major role in determining their success.

Farming-based allied occupations, on the other hand, are those that are directly related to agricultural activities but are not primary farming activities. These can include activities such as animal husbandry, poultry farming, Organic farming, crop diversity, and nursery gardening. Unlike non-farming allied occupations, farming-based allied occupations are often household-specific, meaning that they can be participated in by all members of the family. This can make them a sustainable source of income for the household.

All members of the family can participate in activities such as feeding and caring for the animals, milking them, and selling the milk and meat. This can provide a steady source of income for the family, as well as a source of nutrition. Additionally, farming-based allied occupations can be integrated with primary agricultural activities, such as using cow dung as fertilizer for crops.

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References:

- [1]. Bisht, Nikita, and Puneet Singh Chauhan. "Excessive and Disproportionate Use of Chemicals Cause Soil Contamination and Nutritional Stress." edited by Marcelo L Larramendy and Sonia Soloneski, Ch. 6. Rijeka: IntechOpen, 2020. <https://doi.org/10.5772/intechopen.94593>.
- [2]. Dhanya, P, A Ramachandran, and K Palanivelu. "Understanding the Local Perception, Adaptation to Climate Change and Resilience Planning Among the Farmers of Semi-Arid Tracts of South India." *Agricultural Research* 11, no. 2 (2022): 291–308. <https://doi.org/10.1007/s40003-021-00560-0>.
- [3]. FAO. "Sustainable Development Department BUILDING RESILIENCE FOR AN UNPREDICTABLE FUTURE : HOW ORGANIC AGRICULTURE CAN HELP by Sarah Borron Food and Agriculture Organization of the United Nations Rome , August 2006," no. August (2006): 1–25.
- [4]. Guleria, Sushma, and J K Patterson Edward. "Coastal Community Resilience: Analysis of Resilient Elements in 3 Districts of Tamil Nadu State, India." *Journal of Coastal Conservation* 16, no. 1 (2012): 101–10. <https://doi.org/10.1007/s11852-011-0178-8>.
- [5]. Harishankar, K., K. R. Ashok, V. Saravanakumar, K. Shalander, M. R. Duraisamy, and N. Maragatham. "Determinants of Income Diversification among Dairy Farm Households in Tamil Nadu." *Asian Journal of Agricultural Extension, Economics & Sociology* 40, no. 6 (2022): 109–15. <https://doi.org/10.9734/ajaees/2022/v40i630909>.
- [6]. Lauria, V., Isha Das, Sugata Hazra, Ignacio Cazarro, Iñaki Arto, Susan Kay, P. Ofori-Danson, et al. "Corrigendum to Importance of Fisheries for Food Security across Three Climate Change Vulnerable Deltas Science of the Total Environment 640–641 (2018) 1566–1577 (Science of the Total Environment (2018) 640–641 (1566–1577), (S0048969718320734) (10.1016/j.S." *Science of the Total Environment* 644 (2018): 1650. <https://doi.org/10.1016/j.scitotenv.2018.07.209>.
- [7]. Maiti, Sanjit, Sujeet Kumar Jha, Sanchita Garai, Arindam Nag, R Chakravarty, K S Kadian, B S Chandel, K K Datta, and R C Upadhyay. "Assessment of Social Vulnerability to Climate Change in the Eastern Coast of India." *Climatic Change* 131, no. 2 (2015): 287–306. <https://doi.org/10.1007/s10584-015-1379-1>.
- [8]. Pathak, H, N Jain, and A Bhatia. "Enhancing Resilience of Indian Agriculture to Climate Change." *Special Issue: Natural Resource Management*. 11, no. 4 (2015): 102–15. <https://www.researchgate.net/publication/311144262%0Ahttp://www.faidelhi.org>.
- [9]. Radhapriya, P, S K Divya, K Remya, and K Palanivelu. "Vulnerability and Adaptation Assessment a Way Forward for Sustainable Sectoral Development in the Purview of Climate Variability and Change : Insights from the Coast of Tamil Nadu , India A . Ramachandran *, Dhanya Praveen ,," 10 (2016).
- [10]. Reddy, Krishna Viswanatha, Venkatesh Paramesh, Vadivel Arunachalam, Bappa Das, P. Ramasundaram, Malay Pramanik, Shankarappa Sridhara, et al. "Farmers' Perception and Efficacy of Adaptation Decisions to Climate Change." *Agronomy* 12, no. 5 (2022). <https://doi.org/10.3390/agronomy12051023>.
- [11]. Rengasamy, Pichu. "Soil Processes Affecting Crop Production in Salt-Affected Soils." *Functional Plant Biology* 37, no. 7 (2010): 613–20. <https://doi.org/10.1071/FP09249>.
- [12]. Rigby, D., and D. Cáceres. "Organic Farming and the Sustainability of Agricultural Systems." *Agricultural Systems* 68, no. 1 (2001): 21–40. [https://doi.org/10.1016/S0308-521X\(00\)00060-3](https://doi.org/10.1016/S0308-521X(00)00060-3).
- [13]. Sen, Jayanta. "Growth and Distribution Effects of Changes in Levels of Living in Rural India: A Decomposition Analysis." *Indian Journal of Human Development* 14, no. 3 (2020): 407–23. <https://doi.org/10.1177/0973703020967904>.
- [14]. Tamilnadu, Government O F. "DATABASE ON COASTAL INFORMATION Prepared by Report Submitted To." *Ocean Management*, no. January (2008).