

# RISK MANAGEMENT APPROACHES IN INDIA AGRICULTURE: A CASE STUDY

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## ABSTRACT

Agriculture in India involves variety of risk this risk arise from climate variability frequent natural disasters, manmade disaster, pest out breaks accidental factors, borrowing money can also be risky with sudden changes in interest, risk also occurs as a result of changes in government policies, rural infrastructure, finally there are risks related to the health and well-being of the farmer and his family and the supply of labour for the farm, all these event severally affect farmers through loss in production and farm income and they are beyond the control of the farmers. These factors not only endanger the farmer's livelihood and income but also undermine the viability of the agriculture sector and its potential to become a part of the solution to the problem of endemic poverty of the farmer's and the agricultural labor. Risk management is involves choosing among alternatives that uncertain outcome and varying levels of expected returns. The approach to manage risk is national approach, regional approach and farm level approach. Risk perception can vary from farmer to farmer which depend on his experience and on the degree of his/her risk aversion. The strategies to manage risk include transferring the risk to another party, minimizing the risk controlling the downside or reducing the negative effect of the risk and accepting some or all of the consequences of a particular risk. The inability to manage risk and accumulate and retain wealth sometimes referred to as "the poverty trap".

**Keyword:** Risk Management, risk management approach, Risk Perception, Risk Aversion, Risk Management Strategy

## 1. INTRODUCTION

Government of India has already recognized the importance of risk management in agriculture and has made great efforts to investigate the possibilities of national level risk management system; the need to protect farmers against risk has a concern of agriculture plan. Besides national approach state plan or regional approach and farm level approaches are in existence. It is to the farmers to understand farm business environment and make decision on risk management strategies suitable for their farming activity. Once farmers have decided to engage in farming activities, the production strategy selected is an important means of mitigating the risk of crop failure. Risk reducing strategies are often used in combination with one another, because no single strategy can cover all of the risk likely to be encountered, farmer's need to consider the risks simultaneously and to develop an integrated approach for better management. They need to recognize the advantages and disadvantages of each risk management option both individually and in combination. Individual farmers should select an appropriate strategy based on their goals, attitudes towards risk and their personal and financial situations; Agricultural producers should not limit their risk

management strategies only to lessening and offsetting the problems caused by weather and natural events. Their effective responses to the diver's professional, economic and political challenges are also increasingly crucial to successful farming. Beside it is also equally important to answer the question. How farmer perceive the important of risk factors influencing their activities and the adequacy of the tools and methods of treating such risk? Agriculture has always been the ministry of India economy because of its high share in employment and livelihood creation notwithstanding its reduced contribution to the nation's gross domestic product (GDP). The share of agriculture in the gross domestic product has registered a steady decline from 36.4 percent in 1982-83 to 17.7 percent in 2010 yet this sector continues to support more than half a billion people in India providing employment to 47.9 % of the workforce in the year 2010. Risk is one of the factors affecting agriculture producer directly or indirectly, risk proneness in the absence of effective mechanism for protection against risk has several adverse implications for stability of agriculture production, farm income, and livelihood, investment in farming and application and adoption of improved technology. In the recent times the farmer's suicides are increasing, because of agriculture distress. Farmers course of action to low risk low yield cropping pattern instead of high risk and high yield cropping pattern to mitigate the twin risk of yield and price. It is to be noted that the suicides of farmers as an indication of our failure to manage risks in agriculture. Agricultural risk is associated with negative outcomes that stem from imperfectly predictable biological, climatic and price variables. There is a need to control the downside or reduce the negative effect of the risk from its consequences. According to ISO, organizations manage risk by identifying it, analyzing it and then evaluating whether the risk should be modified by risk treatment in order to satisfy their risk criteria. According to IEC the standards on risk management deals with risk assessment concepts risk assessment process, selection of risk assessment techniques, and also highlighted the questions. According to ISO risk management can be applied to an entire organization, at its many areas and levels, at any time, as well as to specific function, projects and activities. With these new standards in risk management, present study focused on risk management in agriculture on farming activity, thus provides the scope for our present study.

### **Objectives**

- To explain the concepts of risk and risk management and approaches to deal with risk.
- To survey the opinion of agricultural producers on risk and risk management strategies in agriculture among the producers of Andhra Pradesh.
- To examine crisis situations and their possible causes based on producers experience and attributes of crisis situation.
- To survey the risk management strategies and capability of risk reducing methods.
- To analyze production, market, financial, institutional and personal risks and problems while dealing with risk.

### **Research methodology**

Survey conducted in Prakasam district of Andhra Pradesh, survey method is used for data collection, to collect primary data on farmers risk perception, experience, and information source from among the farmers of the district. Personal interview schedule is used for data collection, information collected by using face-to-face information collection mode. Stratified sampling method is used for sampling plan and for analysis purpose; percentages, averages, rating scale method are used.

### **Review of literature**

Planning commission (2007) report of working Group on "Risk management of agriculture" for the five year plan, the report highlighted different types of risks, problems related to risk and risk management. The present study, "research schedule" designed, on the grounds of the Planning commission (2007) working group report. The primary objective of the study is to provide basis for debate by surveying Indian literature and analyzing risk related data and make suggestions for the decision makers of agriculture for discussing a possible future Indian risk management strategy in agriculture. The government of India already recognized the importance of risk management in agriculture and made great efforts to investigate the possibilities of a national level risk management system. Beside national level strategies there is a need for enhancing the regional level risk management strategies. The present study aims at district level risk management strategies applied and factors affecting the applied risk management strategies among the producers of dry land District. The objective of the survey is to explore farmer's point of view and his experience on risk and risk management strategies, for the purpose face-to-face survey method

is used to collect information. Tests applied to analyze the opinions of farmers regarding each risk factor, the reasons and consequences of crises where such incident occurred, to compare the risk management instruments and their capability and information sources currently and information sources currently applied in farming. For statistical analysis purpose, rating scale method, statistical techniques and simple statistical tools are used. Statistics is concern with the aggregate and not just the individual data items or isolated measurement of certain variables. Stratified sampling method is used for the survey; the point of this method is to divide the heterogeneous population into homogenous subgroups, so called strata. Strata are mutually exclusive, so every element in the population must be assigned to only one stratum. The elements of the sample are randomly selected from each stratum, the main characteristic of the proportional allocation is that it uses a sampling fraction in each of the strata that is proportional to that of one's found in population the sample can be considered representation which makes it possible to examine the features of the population on a relatively small sample. The District is divided into 56 , mandals and 1041 gram panchayats, since the gram panchayat is too small a unit to be considered as a planning and monitoring unit, the next unit in hierarchy i.e. mandal has been considered as the planning unit for various agricultural and allied activities. Information collected for a period of five years, 2011 to 2016 month of May. Season ends in the month of March and April which is followed with summer month May, the information is collected in the summer May of 2016..

## 2. RESULTS

### - Risk perception and experience - Prakasam District of Andhra Pradesh

#### 2.1 General information of the farmer

##### 2.1.1 Organizational education of the farmers

Agricultural universities system comprising state Agricultural Universities, Deemed to be universities, central Agricultural University and central university with Agriculture faculty. The Division has a national academy of Agricultural research management at Hyderabad for facilitating capacity building of the National Agricultural Research System in research and education policy, planning and management. Located the ICAR head quarters, the division in headed by the Deputy Director General and has three sections, namely, (i) Human Resource Development, (ii) Education Planning Development, (iii) Education Quality Assurance and Reforms, each headed by an Assistant Director General.

**Table-1 Organizational education of the farmer**

S. No.	Organizational educational/ qualification	No. of Farmers	Contribution %
1	None only practical experience	474	94.04
2	Agriculture secondary School	20	3.96
3	Agriculture University (Graduate)	8	1.58
4	Post graduate studies	2	0.4
	<b>Total</b>	<b>504</b>	<b>100</b>

As per the table-1, farmers of practical experience are 474 (94.04%), Farmers of Agriculture Secondary School are 20 (3.96%), Farmers of Agriculture University are 8 (1.58%) and farmers of Post Graduate studies are 2 (0.4%). Hence it can be construed that majority of the farmers have practical experience only.

##### 2.1.2 Type of farming

Tandon and Dhondyal considered social factors as another category of factors which affect the types of farming. The kind of people in the community and the provision of protection of crop against the hazards of birds and animals ravages may influence the community to change the cropping pattern in a certain directions. The cooperative spirit includes the farmers to put larger acreage under a corp. Farming is classified into six types based on the enterprise. (i) Specialized Farming, (ii) Diversified farming, (iii) Mixed farming, (iv) Dry Farming, (v) Irrigated Farming and (vi) Ranching. Operational decision of the farmer include how much to produce? Answer of this question relates to enterprise-mix. This decision has two aspects i.e., enterprise mix and resource use.

**Table-2**  
**Type of farming activity taken up by the farmer as a source of income**

S. No.	Type of farming	No. of farmers	Contribution %
1	Irrigated farming	152	30.15
2	Dry farming	352	69.84
	<b>Total</b>	<b>504</b>	<b>100</b>
3	Specialized farming	201	40.00
4	Mixed farming	203	40.27
5	Diversified farming	100	19.84
	<b>Total</b>	<b>504</b>	<b>100</b>

Enterprise mix involves degree of specialization or diversification of farming. Combination of crop and livestock enterprises depend on the level of resources available and land use capabilities in addition to the existence of complementary and supplementary relationships. With the above illustration it is asked in the schedule, type of farming activity taken up by the farmer as a source of income. As per the table-2, farmers in irrigated farming are 152 in (30.15%), farmers in dry farming are 352 in (69.84%), farmers of specialized farming are 201 in (4000%), farmers of mixed farming are 203 in 40.27%), farmers of diversified farming are 100 in (19.84%).

### 2.1.3 Income of the farm

One of the main reasons for some farmers to be poor with food and nutritional security is that those who grow staple food crops like rice, wheat may not have additional resources to buy secondary food products like vegetables due to escalating prices. Conversely, those who cultivate secondary crop may face the problem of poor accessibility to staple food items.

As per the table-3, farmers income below twenty thousand are 20 (4.00%), farmers income from twenty thousand and below twenty five thousand are 59 (11.70%), farmers income from twenty five thousand and below thirty thousand are 274 (54.36%), farmers income thirty thousand and above thirty thousand are 151 (29.96%). Hence it can be construed that majority of the farmers are below thirty thousand per acre.

**Table- 3 Income of the farm**

S. No.	Income of the farm (per acre)	No. of farmers	Contribution %
1	Below 20 thousand	20	4.00
2	20 to 25 thousand	59	11.70
3	25 to 30 thousand	274	54.36
4	30 and above	151	29.96
	<b>Total</b>	<b>504</b>	<b>100</b>

### 2.1.4 Farmers experience on risk and crisis

**Table-4 Farmers experience on risk and crisis**

S. No	Risk management instruments	No of Respondents	Contribution in percentage %
1.	YES	488	96.82
2.	NO	16	3.18
3.	TOTAL	504	100

It is asked in the schedule about farmers experience on risk and crises situation in farming activity. In last five years, according to table-4, 488 farmers in (96.82%) responded says 'yes' where as 16 of the farmers 6 in (3.17%) says 'No'. Hence it can be construed that severity of risk is very high in the District.

## 2.2 Production risk

### 2.2.1 Main attributes of crisis situation

**Table-5 showing Main attributes of crisis situation**

S. No	Attributes of Crisis	Crop Production	Live Stock Production
1.	Affected Revenue as a Percentage of Total Revenue	61.47	10.32
2.	Average frequency of crisis situation	02.96	01.44

Agriculture is associated with many types of risk that expose farmers to potential losses. It is important to understand what accidental loss occurs in farming, main attributes of crisis situation, affected revenue as a percentage of total livestock and frequency of crises situation. With the above illustration it is asked in the schedule attributes of crisis situation experienced in crop production. The overall average percentage loss in farming is 61.46 and number of occurrences of crises situation is overall average of frequency of crises situation that is 2.96 in average. It is also asked in the schedule attributes of crisis situation experienced in livestock production. The overall average of affected revenue as % of total revenue of live stock production is 10.32%. Overall average frequency of

crisis situation is 1.44 in livestock production, according to the table-5.

### 2.2.2 Methods capable of reducing risk

It is asked in the schedule to evaluate different risk reducing methods in terms of both crop and livestock production according to farmers personal experience. The respondents could rate the different methods according to the system, namely rating each method on a scale ranging from 1 to 7 where one means that the given method is unsuitable to reduce risk and 7 refers to the high efficiency of the method. It is asked in the schedule to evaluate capability of reducing risk in crop and livestock production. Respondents was the possibility to rate each method on a scale of 1-7 where it means that the give method has no effect on farming while incase of 7 the method has great effect. According to table-6, The overall average shows young animals for self breeding, ex-post medical treatment, preventive medical treatment, Preventive plant protection, relay planting, crop protection are very effective methods where as technology improvement is moderate effect.

**Table -6**  
**Farmer's opinion on methods capable of reducing risk in crop and livestock in prakasam district**

S. No	Method	Contribution in Overall Average
1.	Young animals for self breeding	5.34 (Very Effective)
2.	Ex-post Medical Treatment	5.73( Very Effective)
3.	Preventive Medical Treatment	5.91(Very Effective)
4	Technology Improvement	3.67 (Moderate Effective)
5	Preventive Plant Protection	5.23 (Very Effective)
6	Relay Planting	5.65 (Very Effective)
7	Crop Rotation	5.98 (Very Effective)

## 2.3. Marketing risk

### 2.3.1 Causes for price evolution

Marketing problem decisions include buying of inputs such as seeds, fertilizers, insecticides, equipments etc and selling of farm products. Decisions in respect of questions like when to buy, where to buy and how to buy the farm inputs are made so they should decide the proper time and place of purchase of inputs. Purchase of inputs or combination of inputs should be made at the least cost. Selling requires decisions in respect of questions like when, where and how to sell farm products. Price for a particular commodity is high, farmers produce more and prices eventually fall due to over-supply of the commodity. With the above assumption it is asked in the research schedule causes for price evolution and marketing problems. Respondents were asked to select causes for price evolution. As per the table-7, causes for price evolution, 424 farmers in (86.88%) have responded no answer, change in subsidies or level of price for income support payment 43 in (8.81%), change in world price 9 in (1.84%), change in interest rates and exchange rates 53 in (10.86%), competitive market for input and outputs 57 in (11.68%) and over production or low production 11 in (2.25%). Hence it can be construed that majority of the farmers do not know the reason for evolution of price for farm produced.

**Table -7**  
**Causes for price evolution of farm production in the district**

S. No	Causes for Price Evolution	No of Respondents	Contribution in percentage %
1.	No Answer	424	86.88
2.	Change in subsidies or level of price for income support payment	43	8.81
3.	Change in world price	9	1.84
4	Change in interest rates and exchange rates	53	10.86
5	Competitive market for input and outputs	57	11.68
6	Over production or low production	11	2.25
	Total	488	100.00

### 2.3.2 Member of any Cooperative or producers collaboration or has own written business plan.

Selling agricultural products through contracts or cooperative is less risky due to provisional factors and conditions. Selling the products individually is probably the most risky way or marketing the products, especially where there is increased competition and the farmer lacks bargaining power. With the above assumptions it is asked in the research schedule, farmer member of any collaboration, cooperative or has own written business plan. According to the table-8, 466 farmers in (95.49%) responded 'No' and 22 farmers in (4.5%) respondents 'Yes'. Hence it can be construed that majority of the farmers are not a member of cooperative collaboration or has own business plan.

**Table -8**  
**Member of any cooperative or producers collaboration or has own written business plans**

S. No	Member of any cooperative / producers collaboration / has own written business plans	No of Respondents	Contribution in percentage %
1.	YES	22	4.5
2.	NO	466	95.49
3.	TOTAL	488	100

## 2.4 Financial risk

### 2.4.1 Consequences of financial risk

Scarcity of capital is a serious problem on most of the Indian farms. Now farming is becoming more capital intensive as the now technology demands more investment on improved seeds. Fertilizers, plant protection measures, irrigation, equipments etc, therefore, access to credit, availability and debt play an important role on farming. It is asked in the schedule to evaluate degree of concern on consequences of financial risk. Respondents had the possibility to rate each consequence on a scale of 1-7 where it means that the given consequence has no effect on farmer while in case of 7 the consequence has great effect on farmer and his farming activity. According to the table-9, The overall averages show that farmers consider insolvency and losing job has large effect where as no

credit and equity loss has moderate effect, farmers overall average show, insolvency (5.73), no credit (4.18), losing job (6.93) and equity loss (3.67).

**Table -9**  
**Degree of concern on consequences of financial risk in prakasam district**

S.No.	Consequence of Financial Risk	Contribution in Overall Average
1	Insolvency	5.73
2	No Credits	4.18
3	Loosing Job	6.93
4	Equity Loss	3.67

#### 2.4.2 Farmers perception of access to credit

Bank Loans may greatly help farmers but may also burden them. Debit entails legal and financial obligations that curtail a farmer's power to make decisions and also entails additional risks because the debit has to be repaid within a certain period and thus diverts financial resources from farming activity.

**Table -10**  
**Farmer's perception of access to credit among the farmers of the district**

S.No.	Farmers Perception of access to Credit	No. of Respondents	Contribution in %
1	There is no access to credit at all	284	58.19
2	Cost and conditions are reasonable but requires long procedure	119	24.38
3	There is timely access but with reasonable cost and conditions	73	14.95
4	There is timely access but with hard conditions and high cost	12	2.45
5	<b>Total</b>	<b>488</b>	<b>100.00</b>

Beside it is also asked about farmers perception of access to credit, farmers opinion on access to credit, there is no access to credit at all 284 in (58.19%), cost and conditions are reasonable but requires long procedure 119 (24.38%), there is timely access but with reasonable cost and conditions 73 in (14.95%), there is timely access but with hard conditions and high cost 12 (2.45%). Hence it is construed that majority of the farmers have mixed opinion on access to credit.

#### 2.5 Human resource risk

##### 2.5.1 Farmers problems related to availability and reliability of labor.

**Table- 11**  
**Farmers problems related to employs of the farming activity experienced like availability reliability of labor or availability of skilled labor.**

S. No	Formers Opinion on problems related to employs of the farming activity	No of Respondents	Contribution in percentage %
1.	YES	439	89.95
2.	NO	49	10.04
3.	TOTAL	488	100

According to the table-11, farmers problems related to employs of the farming activity experienced like availability reliability of labor or availability of skilled labor, farmers responder 439 in (89.95%) says 'Yes and 49 in (10.04%) says 'No'. Hence it is construed that problems related to availability of labor exist in farming.

### 2.5.2 Farmers labor back up machinery

**Table -12**  
**Labor back up machinery used by the farmer (or principal operator of the farm) to reduce labor related risk in farming activity.**

S. No	Labor back up machinery used by the farmer	No of Respondents	Contribution in percentage %
1.	YES	18	3.68
2.	NO	470	96.31
3.	TOTAL	488	100

According to the table-12, farmers respond to labor back up machinery used by the farmer to reduce labor related risk in farming, Farmers 470 in (96.31%) says 'No' and 18 in (3.68%) says 'Yes'. Hence it is construed that farmers are not using labor back up machinery in farming to deal with labor related risk.

### 3. FINDINGS

The objective of risk management in agriculture is to reduce the chances of a vulnerable situation occurring, on other hand, maximizing returns to owner's equity consistent with farmer's attitudes to risk. Factors that can influence farmers decision include the farmer's attitude; the costs involved in risk sharing, the relative size of potential loss and probability of it occurring, the correlation of the risk with other risks, other sources of indemnity; the farmer's perception of the nature of risk and the farmer's financial state. Many farmers diversity their production, preferring the lower, more stable income from a diversified set of enterprises to the higher; more variable income generally associated with specialization in a single enterprise. They face uncertainty about the economic consequences of their actions due to their limited ability to predict things such weather, prices and biological responses to different farming practices. It is generally assumed that farmers are risk-averse; i.e., they are willing to pay a premium to reduce exposure to risk. Little attention has been given to investigating farm finance and financial risk in farming; even though this sector is still important in developing economy. It farmers cannot manage variability in production they will not be able to use good price risk management techniques, so they will not have enough produce to sell. The enhanced green house effect and consequent global warming will increase the risk

burden on agriculture. Human resource issue is the flow of people from rural to urban areas. These policies include controlling emission levels; setting occupational health and safety regulations, controlling toxic wastes, regulating land use; zoning, establishing water rights and area limitations; determining patent rights; regulating genetic engineering, controlling water quality etc. Policy risk has adverse implications for agricultural decision makers both before and immediately after policy changes. Farmers are less predictable, competitive markets for inputs and outputs, so that price or market risk is other significant and may increase over time. Production risk as a possibility that the level of physical output that is planned will not be achieved. Variation in output arising from weather, pests and diseases, input quality and availability, the inherent variability change system and technological change. Financial risk can be viewed in three dimensions Interest rate change, Liquidity and Solvency.

Drought proofing and flood control, health improvement and prevention of disease, risk financing, disaster management. Conservation of natural resource and livelihood enhancement are the major components of risk management in agriculture.

- Suicides of farmers as an indication of our failure, to manage risks in agriculture the study is an important step towards strengthening risk management in Indian agriculture. The agrarian distress of late is assuming lot of significance and should be handled urgently. Sources of risk perceived by farmers of the five categories of risk that have been identified, price and production risk were perceived as the most important source among the farmers of the District.
- Study indicates that except for enhanced credit, other variables have not grown proportionately.
- Sources of risk perceived by farmers of the five categories of risk that have been identified, price and production risk were perceived as the most important source among the farmers of the District.
- Falling rate of capital formation in agriculture, low and fluctuating levels in crop productivity, inadequate irrigation facilities, depleting soil resources, skewed agricultural price support policies needed corrective action.
- Farmers resort to low risk low yield cropping pattern instead of high risk and high yield cropping pattern to mitigate the twin risk of yield and price.
- Tanks based watershed management, conjunctive use of surface and ground water, natural resources management for livelihood enhancement are the emerging trends in farming.
- As farmers start producing for the market, price risks become important. Because of inelastic demand shall increases in crop output can crash prices, it is true with perishable products and with small remote markets.
- Farmers are unable to predict the future to use several aids, most of the farmer's are not in touch with extension and research specialist from state agricultural college/universities. They do not know about the supply and demand forces which cause variation in prices and are not making use of outlook materials available from agricultural colleges, Government, commercial sources and news papers.
- Lack of managerial skills among the farmers due to illiteracy, small size of holding, scarcity of resources, lack of awareness and business attitude are the causes for high risk and low income.
- Agricultural Insurance is only of limited use need for penetration which acts as a risk profiling tool.
- Lack of managerial skills among the farmers due to illiteracy, small size of holding, scarcity of resources, lack of awareness and business attitude and unwilling of farmers family member participating in farming are the causes for high risk and low income.
- There is limited role played by cooperative institution and farmer's SHGs, which could play their role to hedge in the futures market, aggregators can hedge on behalf of the farmers in the futures market, as they have the requisite knowledge and operational skills need to participate in the future market.

#### 4. SUGGESTIONS

- Public policy in agriculture trade needs to be modified to enable us to emerge as a grain power, to take advantage of the emerging opportunities in the global arena post-WTO agreement.

- To protect farmers against production risks, the Central Government together with the State Governments offers crop insurance; scheme as yet covers a small minority of farmers. It is important to increase the penetration of crop insurance in agriculture, this is possible only by bring awareness because most of the farmers believe crop insurance cannot pay off its cost.
- There is a necessity to create an awareness among the farmers on large scale basis to enable them develop progressive attitude responsive to improve agricultural techniques.
- Information and communication enabled cost effective agricultural extension services need to be popularized throughout the country by replicating success stories like 'AMUL' across the country.
- Quality of the farm produced is one of the most important areas to be improved as per the consumer point of view. Organic certification is an important service to be provided by the government of emerging organic farming, thus boost the market value of farm produce both at National and International level.
- Self hedging (Farmers as hedgers) and direct marketing should be popularized as an alternative risk management tools to deal with price risk by Internet Penetration into rural area.
- Capacity building is a continuous process for imparting knowledge, Skill and required competencies to the farming community. Important approaches are capacity building of farmers are farmer's field schools, participatory technology development, on farm demonstrations etc.

## 5. CONCLUSIONS

Risk exposure of agricultural holding will increase in the future which make farmers face huge losses more frequently. To deal with risk in agriculture it is the duty of the farmer to apply adequate risk management strategies and tools. Global economic environment, affect of climate change, poor management practices enhances the problem of risk in Indian agriculture. Applying low risk technologies, diversification, agricultural insurances, hedging, contracting, policy regulations, information support, effective use of natural resources and professional training will play an increasingly important role in the risk management practices of the farmers. There is a need for holistic approach to bring farm stability, profitability, effective use of natural resources, effective use of government programmes and skillful management; it is possible by selecting integrated farming as low risk activity.

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