

# SFSA'S DANA PANDAN PROJECT STRENGTHENS FARMERS IN INDONESIA WITH WEATHER INSURANCE

## PROJECT SNAPSHOT



**Project Period** 2017 - 2021

**Reach** 8,034 rice farmers reached  
451 participants across 6 regencies

**Scaling potential** 13.1 million rice smallholders  
in Indonesia



**Funding Sponsor** SFSA

**How the funding was used**

**Product development** Design of Weather Index Insurance product - collection of agricultural data and purchase of weather data - in-house development of the software system for a premium rate assignment

**Awareness raising** Design of marketing tools and organisation of awareness campaigns

**Other partners** **Strategic partner** YASI **Financial Institutes** six micro-finance institutions (MFI) and cooperatives **Insurance companies** Mandiri AXA General Insurance (MAGI) and previously ACA



**Technology** Weather index-based insurance against drought

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In 2017, the Syngenta Foundation for Sustainable Agriculture (SFSA) started a pilot to develop and promote **weather index-based insurance (WII) for smallholder rice farmers** in Indonesia. In August 2020, SFSA decided to partner with **YASI** as its local implementation partner. They chose to work with smallholder rice farmers, because of their potential impact: every third household in Indonesia grows rice (BPS 2018 agriculture intra-census). Drought is one of the key causes of reduced yields or even crop failure. In recent times, the start of the rainy season has increasingly been delayed, and rainfall has become more erratic. This is very likely to cause decrease or complete elimination of rice yield.

Index-based weather insurance has potential to be a commercially attractive proposition for insurance companies, as it offers operational efficiencies. For example, the claims process uses objective, readily accessible data. Pay-out is based on deviation from pre-determined precipitation levels. This is a great advantage over the time-consuming and costly field assessments necessary for the more common indemnity insurance products. The claims process is fast enough for farmers to use the pay-out to prevent yield reduction or crop loss.

	WEATHER INDEX-BASED INSURANCE	INDEMNITY-BASED INSURANCE
CONCEPT	<b>Ante facto</b> - Pay-out after a trigger event impacting crop performance	<b>Post facto</b> - Pay-out "after the fact", i.e. after crop failure
PURPOSE	To cover the investment required to prevent crop loss	To cover the production costs associated with crop loss
ASSESSMENT	Objective data from weather stations or satellites	Individual assessments by an insurance officer in a farmer's field

This case study describes the benefits and limitations of the current weather index-based insurance for smallholder rice farmers. We assess its impact on the three pillars of Climate Smart Resilient Agriculture: Resilience, Mitigation and Profitability.

## WEATHER INDEX-BASED INSURANCE: PRODUCT BENEFITS

- Efficiency: Objective satellite data replace in-field assessments**  
 Index-based weather insurance is *ante-facto*: it pays out when a trigger event crosses the threshold specified in the policy, e.g. a specific amount of rainfall. As the insurance company does not need to conduct in-field assessments, the claim settlement process can be faster and more cost-effective.
- Accountability: Preventing rather than covering crop loss**  
 The aim of a weather index-based insurance is to save the crop. As the claim process is fast, it allows and incentivizes farmers to use the pay-out to save their crops. On the contrary, indemnity-based insurance only comes in when the crop has already failed.
- Affordability: Rainfall shortage rather than total water need**  
 The insurance was introduced in the rainy season when farmers exclusively rely on rainfall to meet their crops' water needs. In the dry season, farmers typically rely on a combination of rainfall and irrigation. The insurance only covers the risk of too little rainfall, as that is the part outside farmers' control. This helps keep premiums affordable, also in the dry season.

# PROJECT DESIGN

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In order to build a sustainable market, YASI opted for a ‘bundled’ solution offered via financial institutions. This package combines insurance with access to finance, inputs and advice.

The institutions provide financial advice; a ‘Train the Trainers’ program for farmers helps embed good farming practices. Bundling reduces the risks and costs for the financial institutions and insurance companies. It also makes the offer more attractive for smallholder customers.

## Reducing the risks and marketing costs of smallholder loans for MFIs

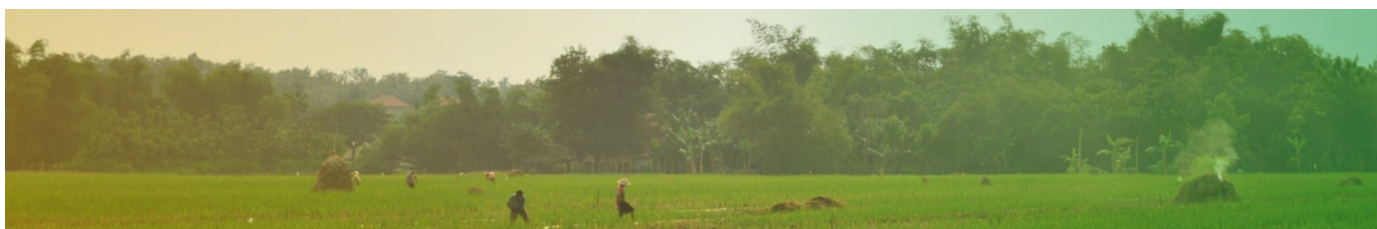
A bundled solution reduces the risk for micro-finance institutions (MFIs) of lending to smallholders. The micro-insurance **limits the risks of drought-induced crop failure**. The combination of good inputs and training on Good Agricultural Practices (GAP) helps farmers to increase their yield and profits, and hence their **ability to repay the loan**. As part of the GAP-training, farmers also learn to **respond effectively to pests and diseases**. YASI also organises financial awareness campaigns among smallholder farmers, **subsidizing part of the MFIs’ marketing investments** to tap into this new market.

## Improved efficiency and cost-effectiveness for insurance companies

The introduction of weather index-based insurance **improves the cost-efficiency** of insurance companies. Unlike conventional indemnity-based insurance, parametric insurance does not require costly individual in-field assessments. The MFIs that serve as a delivery channel also provide all required documentation, **greatly reducing the administrative burden** typically involved in insuring large numbers of smallholders. Farmers’ frequent reluctance to invest in a standalone insurance product is overcome by proposing it together with an agricultural loan.

## More stable and higher yields for farmers via bundled solutions

Smallholder farmers benefit from **better yields and profits** by having access to the working capital that is required to invest in quality inputs combined with training on Good Agricultural Practices. The weather index-based insurance protects them against crop loss caused by droughts, and they are also trained to deal better with pests and diseases.



# ROLES AND RESPONSIBILITIES

The table below outlines the roles and responsibilities of the various project partners. YASI aims to continue developing viable agricultural insurance products adapted to smallholders' needs.

<p><b>YASI</b></p>	<ul style="list-style-type: none"> <li>- Development of index-based insurance product</li> <li>- Technical assistance to insurance companies</li> <li>- Capacity-building of FO on insurance consulting and agricultural advice</li> <li>- BUilding connections to suppliers of good agricultural inputs</li> <li>- Training on the planning and implementation of the Dana Pandan operations</li> <li>- Formulate objectives across the 3 CSRA pillars</li> </ul>
<p><b>FINANCIAL INSTITUTIONS</b></p>	<ul style="list-style-type: none"> <li>- Development of the credit product</li> <li>- Distribution of the credit product</li> <li>- Training / knowledge transfer of GAP</li> </ul>
<p><b>MANDIRI AXA GENERAL INSURANCE</b></p>	<ul style="list-style-type: none"> <li>- Distribution of parametric agricultural insurance product</li> <li>- Payment of claims</li> </ul>
<p><b>INPUT DISTRIBUTOR</b></p>	<ul style="list-style-type: none"> <li>- Supplier, ensuring availability of required inputs</li> </ul>



## HOW INSURANCE HELPS SMALLHOLDERS FARM CLIMATE-SMARTER

Rice-growers need to manage water carefully. If too little rain falls, farmers typically need to irrigate their fields to save the crop. If time allows, they may re-plant. Either response raises production costs, which not every farmer can afford. Lack of rain is one cause of supply shortages, which rapidly increase market prices. Countries like Indonesia suffer particularly from high rice prices as the crop is a crucial staple food.

## HOW THE PROJECT IS CURRENTLY CLIMATE-SMART



### MITIGATION



### RESILIENCE

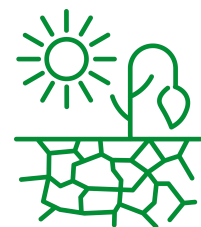


### PROFITABILITY

<b>Access to finance</b>	<ul style="list-style-type: none"> <li>+ Increased efficiency due to better inputs</li> <li>+ Improved soil health</li> </ul>	<ul style="list-style-type: none"> <li>+ Better cash management</li> <li>+ Improved financial literacy</li> </ul>	<ul style="list-style-type: none"> <li>+ Lower interest costs</li> <li>+ Improved yields and/or higher selling price</li> </ul>
<b>Technology and advice on farming practices</b>	<ul style="list-style-type: none"> <li>+ Increased overall input use efficiency</li> <li>+ Improved water use efficiency</li> <li>+ Improved soil health</li> </ul>	<ul style="list-style-type: none"> <li>+ Better water and nutrient management</li> <li>+ Reduced crop loss from pests and diseases</li> </ul>	<ul style="list-style-type: none"> <li>+ Improved yield and/or higher selling price</li> </ul>
<b>Insurance</b>	<ul style="list-style-type: none"> <li>+ Reduced greenhouse gas emission per ton of rice output (due to reduced crop loss)</li> </ul>	<ul style="list-style-type: none"> <li>+ Reduced crop loss due to improved financial cushion</li> <li>+ Protection of personal cash flow</li> </ul>	<ul style="list-style-type: none"> <li>+ More stable profits, also in the event of a drought</li> </ul>



# PILLAR 1: MITIGATION



- **Reduced soil / water contamination:** Via the agricultural loan, farmers have working capital to invest in better inputs. In parallel, the GAP-training teaches them about more efficient input use. Both factors help reduce soil/water contamination. The table below illustrates the amount of waste per ha depending on the amount of fertilizer used.

SCENARIO	FERTILIZER USE	WASTE AMOUNT	IMPACT
<b>Underbalanced / overuse</b>	More than the recommended amounts	Excess	<ul style="list-style-type: none"> <li>- Decreased soil health,</li> <li>- Low pH</li> <li>- Inefficient pest and disease pressure</li> <li>- Sub-optimal productivity</li> </ul>
<b>Optimum</b>	Depend on local NPK specifications	Minimized	<ul style="list-style-type: none"> <li>+ Improved soil health</li> <li>+ Maximized absorption of fertilizer</li> <li>+ Maximized productivity</li> </ul>

- **Better water use:** Farmers can usually reduce the amount of water they use for rice production. During the GAP-training, they learn about improved irrigation schedules and the use of drip-irrigation. The table below compares two water usage scenarios.

SCENARIO	PERIOD OF FLOODING	WATER LEVEL
<b>Current water usage</b>	Vegetative and reproductive stages	Depends on farm location, access to irrigation and rainfall
	1-10 DAT*	2 - 5 cm
<b>Optimal water usage</b>	11 DAT onwards	0 or 2-5 cm, changing every 7-10 days
	During flowering stage	2 - 5 cm
	10 - 14 days before harvest	0 cm

Based on Ministry of Agriculture, Rice Research Center, Standard Operating Procedure on rice cultivation. \*DAT – days after transplanting

Even with guidance, implementing the recommendation is not straightforward. Local conditions vary considerably. Irrigation and drainage quality, village water use policy, soil type and farmers' expertise all play a role. However, following the recommendations would increase water efficiency and productivity.

Further mitigation aspects include:

- **Improved soil health:** Replacing synthetic fertilizers with natural ones, combined with more efficient pesticide use, can improve soil health.
- **Reduced greenhouse gas (GHG) emission per ton of rice output:** Better inputs combined with GAP increase yields. In addition, agricultural insurance protects against crop failure, and thus avoids unnecessary GHG emissions.

## PILLAR 2: RESILIENCE



- **Better cash management:** If there is a drought, the insurance pay-out will, for example, cover the cost of sourcing water. This allows farmers to invest their personal funds in other inputs such as seed.
- **Improved financial literacy:** During awareness campaigns, farmers learn through simulations about the benefits of borrowing money through formal institutions as well as financial risk mitigation through insurance.
- **Better weather and soil nutrient management:** Improved input use contributes to better soil health, which in turn helps manage water and nutrients, also during extreme weather events.
- **Cropp loss:** The GAP-training teaches farmers how to deal better with pests and diseases, preventing crop loss. In addition, actions enabled by the insurance pay-out can reduce damage to a negligible level and avoid total crop loss (unless there is widespread systematic damage, for example because of a pest invasion).

## PILLAR 3: PROFITABILITY



- **Lower interest rates than from middlemen:** In Indonesia, 50% of borrowing households take a loan with an individual lender. 90% of smallholders do not have adequate collateral to access formal financial services (World Bank Indicators Indonesia, 2020). MFIs charge lower interest rates than individual lenders.
- **Improved yields and / or higher selling price:** Access to better inputs and improved knowledge of GAP have increased yields by 19% and selling prices by 4%. The higher prices resulted from better quality at a time of lower overall supply because non-participating farmers suffered crop losses to drought.
- **More stable profits:** Farmers experience more stable annual profits. The weather index-based insurance covers the investments needed to prevent crop loss.

There will only be a sustainable market for insurance bundles if all sides benefit financially. The following section / pages compare the yield, revenues and profits of participating farmers to a baseline before they had access to the bundled solution. We also present a financial model for the insurance company and the MFIs.





# 1 SMALLHOLDER RICE FARMERS

## 24% REVENUE GROWTH

The higher yields and prices described above lifted participating farmers' revenue by 24%

## 26% INCREASE IN PROFIT

Although their investments per kg of output increased by 3.8%, participants' profit rose by 26%.

**The participants** farm in a range of conditions across West and East Java. The results presented here are the average of 41 West Javan smallholders during the wet season 2017 - 2018.

	PROJECT RESULTS	BASELINE SCENARIO	IMPACT
Yield (ton)	8.51	7.31	<b>+19%</b>
<b>Revenues (\$)</b>	<b>2 499</b>	<b>2 009</b>	<b>+24%</b>
Farm expenses (\$)	688	569	+21%
<i>Farm expenses / tons of produce (\$)</i>	<i>81</i>	<i>78</i>	+3.87%
<b>Profit (\$)</b>	<b>1 811</b>	<b>1 440</b>	<b>26%</b>







## 2 MICROFINANCE INSTITUTIONS

In the table below we show three business case scenarios for the provision of agricultural loans by MFIs. These scenarios are based on practical examples across various regencies in West and East Java. The geographical location is important because it affects the:

- Average farm size, and hence the loan amount
- Conversion rate – farmers in some regions are more open to loans than counterparts elsewhere
- Marketing costs, which depend on the infrastructure available to reach farmers

### AGRICULTURAL LOANS ARE ALREADY PROFITABLE WITH 200 PARTICIPATING FARMERS

Many MFIs in Indonesia are small but profitable. Our business case shows that agricultural loans can already be profitable for a MFI lending to about 200 farmers.

### NON-PERFORMING LOANS - A CRITICAL INDICATOR

The percentage of Non-Performing Loans (NPL) is a critical indicator for MFIs. During the pilot there were no NPL – in other words, all farmers repaid their loans. This compares to a target NPL level of 0.7% in the business case.

#### BUSINESS CASE SCENARIOS

	Low	Medium	High
Number of farmers	100	200	500
Loan amount (\$)	66 500	133 000	332 500
Turnover (\$)¹	5 320	10 640	26 600
<b>Total costs (\$)</b>	<b>6 230</b>	<b>10 780</b>	<b>23 870</b>
Fund overhead costs (\$)²	2 660	5 320	13 300
Marketing costs (\$)³	3 010	4 340	7 770
Account officer bonus (\$)⁴	203	399	1 001
Non-performing loans (\$)⁵	357	721	1 799
<b>Profit (\$)</b>	<b>-910</b>	<b>-140</b>	<b>2 730</b>

¹ **Turnover (T/O)** consists of (i) the interest revenues + (ii) the commission on the insurance premium.

² **Fund overhead costs** have been calculated as 13% per annum of the total loan amount.

³ **Total variable costs** include the salary of an account manager (IFTE) + the costs of marketing activities

⁴ The **account officer bonus** equals 1% of the loan amount to new customers.

⁵ **Non-Performing Loans** include the write-off of loans and lost interest revenues.



### 3 INSURANCE COMPANY

The table below shows three business case scenarios for insurance companies.

#### CURRENT VOLUMES FAR BELOW BREAK-EVEN

In four years, 402 farmers signed 453 insurance contracts covering 488 hectares. The peak year was 2020, with 206 contracts for 255 hectares. According to the business case, break-even comes at about 900 hectares. The low volumes are explained by farmers' reluctance to take out a loan and MFIs' resulting hesitation to invest in smallholders as a customer segment. More details are provided in the section below.

#### BUSINESS CASE SCENARIOS

	Low	Medium	High
Number of hectares insured	300	900	1500
Amount insured/loan amount (\$)	116 900	350 630	584 360
Turnover (premium received, \$) <sup>1</sup>	3 500	10 500	17 500
<b>Total expenses (\$)</b>	<b>5 922</b>	<b>10 213</b>	<b>14 504</b>
Variable marketing costs (\$) <sup>2</sup>	378	1 134	1 890
Variable overhead costs (\$) <sup>3</sup>	14	42	70
Fixed overhead costs (\$) <sup>4</sup>	3 780	3 780	3 780
Claim paid (\$) <sup>5</sup>	1 750	5 257	8 764
<b>Profit (\$)</b>	<b>-2 422</b>	<b>287</b>	<b>2 996</b>
Premium %	3	3	3
Claim Ratio %	50	50	50

<sup>1</sup> **Turnover (T/O)** is calculated by multiplying the insured amount with the insurance premium rate. In the business case, the insurance premium rate is 3%. In reality, the premium rate varies (1.88%-5.99%), depending on the client's risk profile. The insured amount is equal to the loan provided by the MFI, which is typically between \$700 and \$840 per hectare.

<sup>2</sup> **Variable marketing costs** include the commission paid to the MFI, the cost of marketing materials and a provision for marketing events

<sup>3</sup> **Variable overhead costs** include printing costs of the insurance policy and certificate

<sup>4</sup> **Fixed overhead costs** include the salaries of a field officer and administrative officer

<sup>5</sup> The **pay-out** is estimated using a claim ratio of 50%. By law, the claim ratio needs to equal at least 50%, meaning that the actual pay-out cannot be less than half of the total revenues in insurance premiums.





## LIMITED CUSTOMER BASE INCREASES RISK FOR INSURANCE COMPANIES

The claim ratio is the percentage of its revenues that an insurance company reserves to cover potential claims. The business case assumed a claim ratio of 50%. In reality, the ratio varies each year, depending on the incidence and magnitude of weather events, as shown in the table below. Over the first four years, the average claim ratio was 210%. This was mainly the a result of the severe impact of *El Niño* in 2017, when the claim ratio was nearly 1000%. A larger, and more geographically diverse customer base helps to spread the risk, reducing the claim ratio.

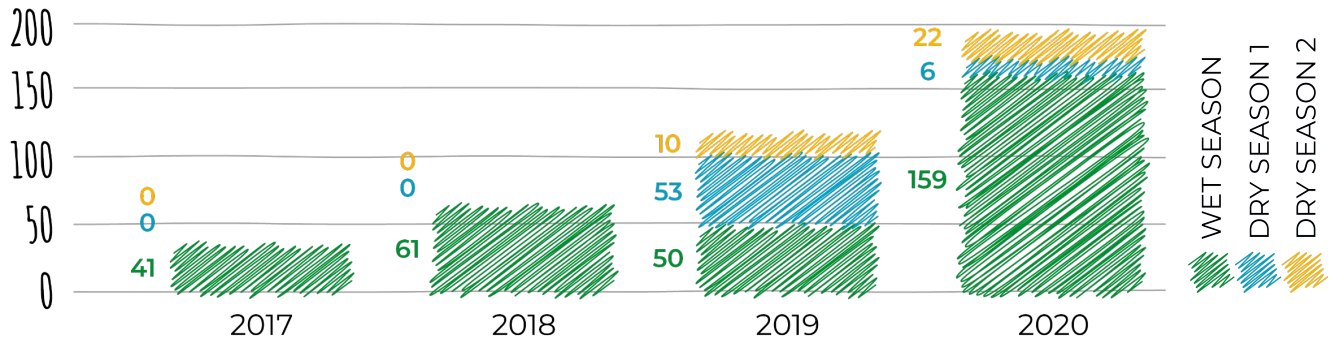
	ACTUAL RESULTS			
	2017	2018	2019	2020
<b>Amount insured</b> (loan amount, \$)	28 224	51 975	74 081	94 465
<b>Turnover</b> (premium received, \$)	1 683	1 449	4 067	4 900
<b>Claim paid (\$)</b>	15 778	273	8 876	441
<i>Premium %</i>	6	3	4	3
<i>Claim Ratio %</i>	962	19	218	9



# RESULTS TO DATE

- Growing but still low number of participants:** Since 2017, more farmers have participated each year, but absolute numbers are still low. The increase is partially caused by the introduction in 2019 of a weather index-based insurance for the dry seasons alongside that for the wet season. One reason overall adoption has remained low is that the insurance does not cover excess rain or floods, making it less attractive to farmers.

**Table 1:** Number of participating farmers



- Highest subscription rates in wet season:** Most loans are provided in the wet season. MFIs usually hesitate to give farmers credit in the dry season, when risks are higher. Some farmers choose not to sign up during the dry season, as they can reinvest their wet season profits then instead.
- Fluctuating conversion rates:** The table below shows how few of the farmers reached by marketing activities then signed up for the bundled solution. This 'conversion rate' has fallen markedly overall but went up and down. One reason is that some MFIs already have a suitable customer base, which results in a high rate. Others have hardly any smallholder clients so far. In East Java, a further factor is that farmers typically own small plots. They can easily raise informal financing and are thus more reluctant to invest in a bundled solution.

	2017	2018	2019	2020	2021
Number of farmers contacted	88	510	2,265	2,153	3,018
Number of resulting customers	41	61	113	187	49
Conversion rate	<b>46.6%</b>	<b>11.9%</b>	<b>4.9%</b>	<b>8.7%</b>	<b>1.6%</b>



This section looks at the attractiveness of the bundled solution for all three parties: farmers, MFIs and the insurance company.



## 1. FARMERS

### FARMERS BENEFIT VIA **HIGHER YIELDS & IMPROVED FINANCIAL LITERACY**

Participating farmers raised both yields and profits well above those they had had before the bundled solution. The financial and insurance training also improved their understanding of risk management

### FARMERS BECOME MORE RESILIENT TO DROUGHT-INDUCED CROP LOSS

Over the four years, farmers were twice confronted with El Niño, and in both cases received a pay-out. During the El Niño droughts of 2017, there was a claims pay-out of nearly 1000%. Farmers used this money to cover the rent and fuel for irrigation pumps, which let them rescue their crops.



## 2. MICROFINANCE INSTITUTIONS

### MOST MFIs LACK **SMALLHOLDER CUSTOMERS**

Fewer than 5% of farming households take out loans; only 2% of these use MFIs – i.e. a mere 0.1% of all smallholders. One important reason is that MFIs require collateral, which few such farmers can provide.

### AGRICULTURAL LOANS CAN BE PROFITABLE; **THE RISKS ARE MANAGEABLE**

To lend to them profitably, the financial model suggests that MFIs need more than 200 smallholder clients. During the pilot, there were no credit defaults; this was better than the expected 0.7% of non-performing loans. A combination of good inputs, extension advice and insurance seems effective in managing the risks usually associated with smallholder lending. Training by MFI staff also helped farmers to understand risk management better.

### MFIs REMAIN **RELUCTANT TO INVEST**, FOR VARIOUS REASONS

Despite the positive pilot results, MFIs remain reluctant to invest in the smallholder loan market. They prefer to pursue the 'low-hanging fruit' such as consumer credit or traders' working capital loans where demand is strong. Selling agricultural loans requires greater marketing efforts. MFIs also face competition from government-subsidized loans. Furthermore, they carry the risk to their loans of excess rain and floods because the current insurance product does not cover these.



### 3. INSURANCE COMPANIES

#### CURRENT VOLUMES **TOO LOW**

The commercial viability of an insurance product depends on the size and diversity of its customer base. MFIs are currently unable to deliver the number of customers needed for insurance companies to break even.

#### CLAIM RATIO **TOO HIGH**

During 2016-2020, the claim ratio averaged 200%, four times the target. The pay-out was double what farmers paid in premiums. The small customers base offers limited opportunities to hedge risks.

#### THE INSTITUTIONAL FRAMEWORK

Government policies impact the effectiveness of the bundled solution in various ways:

- The government offers subsidized agricultural loans that are difficult to access for MFIs and rural banks. More farmers would probably enrol in the program if these institutions were able to offer competitive interest rates.
- The government encourages MFIs and rural banks to lend to smallholders. However, MFIs lack the necessary knowledge and investment motivation to make this possible.
- + On a positive note: A Presidential Decree on agricultural insurance is currently being developed. This may encourage insurance companies to invest in micro-insurance in the future.



# NEXT STEPS

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Based on the lessons so far, the project team considers the following changes over the coming years:

## 1. EXPLORE ALTERNATIVE DELIVERY CHANNELS

MFIs have few smallholder customers and largely seem unwilling to change this. YASI will therefore explore new delivery channels for micro-insurance, e.g. large fertilizer companies or agricultural shops and platforms.

## 2. INTRODUCE AN INTEGRATED OPERATIONS PLATFORM

This would simplify the operations of MFIs and insurance companies, reducing the administrative expense of serving smallholders. However, the significant investment requires additional funding.

## 3. INVEST IN NEW PRODUCT DEVELOPMENT

YASI will work with the SFSA product development team to develop other index-type insurance products with a more comprehensive risk coverage, e.g. area coverage.

## 4. TARGET FARMERS IN RAINIER REGIONS

The current insurance product only covers a lack of rain. It therefore makes sense to target farmers who grow rain-fed rice, rather than those who rely on irrigation.

