



Food and Agriculture Organization
of the United Nations



**A MANUAL TO FACILITATE
PARTICIPATORY PLANNING ACTIVITIES
TO EMPOWER COMMUNITY IPM**

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Participatory Planning Activity

Introduction

What is the planning?

- ❑ Is not that individual is brought as by invisible hand seeking of his/her own advantage to secure that of community at large
- ❑ Is what is expected contribution of his/her own work and that of his/her fellows to the life of the community
- ❑ Is a systematical effort to solve their problem by the way to get the ideal conditions
- ❑ Is systematical effort to create the dream of ideal condition

What is participatory and why do it?

- ❑ Participatory is to take part or have a share with awareness in common with others.
- ❑ Participatory is the educational process by doing together
- ❑ Human being is subject of him/her self, so, a decision that will influence to their future life should be agreed by them
- ❑ Every person has equal position and access to resources
- ❑ Every person get the opportunities to actualize them selves
- ❑ Effectiveness and efficiency in management

What is the principles of participatory planning

- ❑ Equality: the participant position is equal, they have the right to communicate their ideas and listened equality.
- ❑ Each participant truth to other and can be truth by other.
- ❑ Democratic: the decisions should be decided by participant without driving and oppression, that is better if by consensus
- ❑ Logic: the ideas should be test by logical reasoning, or participant commonsense.
- ❑ Empiricism: the ideas should be check by empirical experiences mostly participant's experience or feeling and seeking.
- ❑ Focus on participant problem or participant necessary not on project needs.
- ❑ Open for critical thinking.

Who is participant

- ❑ Every body that interested in their problem, and want to solve together, want to contribute what they have, and what they can.

What is the goal

- ❑ To increase the participant capabilities to manage their problem selves by participatory and systematic ways.
- ❑ The problems be solved and managed by participant.

What is resulted

- ❑ The frame of program planning based on the goal structure e.g. the goal statement, the purpose, the results, and the activities.
- ❑ The describing of stages activities of planning
- ❑ Participant have a common idea and be aware where is their position vis-à-vis the other group.
- ❑ Participant involves full participation

What are stages to do it?

0. Participatory Planning Perception
1. Selves identification: who we are (what is about met us together), how about relationship between us and other
2. Define the vision of community IPM
3. Problem identification and analyzing
4. Goal analyzing
5. Alternatives analyzing
6. Describe the program matrix
7. Identify of participant role and analyzing
8. Built the organization
9. The necessity analyzing
10. Describe the works plan

The techniques

- Meta-plan technique: using media to visualize the ideas and opinion, flexible to move
- Logical frame work building technique by way to describe the causal-effect relationship of two or more variable.
- Visualizing the problem tree and the goal tree
- Sharing ideas and focus discussion

The tools

- The stereo-form: three pieces of 2 x 1 meter
- Number of pieces card: 18 x 12 cm., about 200 pieces
- Large papers, about 20 exemplars
- Pushpin about 150 pieces
- Art-line about 25 pieces, depend on how many participant
- Paper glue and lack-band.

0. Participatory Planning Perception

<i>Preface</i>	Before to do the steps of participatory planning activities we need explore participant perception about participatory planning that they have. By the way we will get same perception and way of thinking how to do participatory planning. That will be easy more for a discussion process and effectiveness of planning activities.
<i>Objective</i>	<ul style="list-style-type: none">❑ Participants prepare to involve in participatory planning activity.❑ Get a common perception about participatory planning.
<i>Material</i>	Large papers, art line 70.
<i>Time</i>	45 minutes
<i>Procedure</i>	<ol style="list-style-type: none">0. Ask participant: "What they think about Participatory Planning is?" "What is planning they think, and what is participatory?" " Why do participatory?"1. Write all of their ideas and make clear what they say by clarification. Facilitator helps them to describe about that.2. Who will participate in planning activity, and why?3. Make conclusion about it.

1. Self Identification

<i>Preface</i>	Group perception about a things depend on who are they, where they exist, what they have, and what they want. Its means the perception is produced by subjectivity. So, selves-identification drives their perception. That's way group identification has to describe before to define what their vision and what their problem.
<i>Objective</i>	□ Participants be aware who they are, who connected with them, who is lost and who is win in this relationship, and where their position, how to improve this relationship situation.
<i>Materials</i>	A number of large papers, number of art lines 70.
<i>Time</i>	60 minutes
<i>Procedure</i>	<ol style="list-style-type: none"> 1. Preparation: be prepared the tools e.g. the large paper on board, art-line 70. 2. Tell participant that problem perception of group depend on who are they. So ask the participant to reflex who are they, what is the reasoning that makes they being together, and what the matter that makes they different with other? With whom? 3. Identify who the others has relationship with farmer and who support them. Make clear: what does support mean? What kind of supporting? 4. Draw farmer picture in the central of the paper and the other on around the farmer picture. Ask participant: why do they have relationship with farmer, what do they want and what do we need, who is benefit and who is lost, why that is happen, then what our suggestion. 5. Write their ideas on simple table as below (see table 1) 6. Ask participant to make the conclusion and what their recommendation based on their conclusion, then write their ideas.

table 1: Position analysis

Who are they and who support them	What are they offer	What they have get	Who get more benefit	What our suggestion
1.Sales-person supported by industry.	Pesticide and its usefulness	Money	Sales person and pest industries	Listen what their say critically Farmer has to good negotiate
2.Politician supported by ...	Slogan, dream, future	Vote, then went	Politician	
3.industries supported by bank.				
4.Bank supported by capital				

2. Vision of Community IPM

<i>Preface</i>	The role of vision is to pull us toward with an image of what that future could look like. Base on vision, we will clear more to define the real and important problem that we posed.
<i>Objective</i>	<ul style="list-style-type: none">❑ Available clear vision of community IPM for five years.❑ Awareness toward farmer future is dependent on farmer foot.
<i>Material</i>	Forms, large paper, art line, crayon.
<i>Time</i>	90 minutes
<i>Procedure</i>	<ol style="list-style-type: none">1. Tell to participant that the plan is a systematical effort to realize the ideal condition or the future image. So, we should have clear vision of community IPM. But who has to build the vision of community IPM? Expert? Official? Farmer? Together? Who is the first? Wait their respond!2. Now, we will build vision of our community IPM. Give to each person one individual worksheet of vision, and ask them to fill or answer the question individually.3. Divide participant into small group (about 7 persons in one group), and give them a task to discuss their vision then ask them to draw their vision. One group one picture.4. Plenary discussion and make conclusion for all participant. What will participant's vision of community IPM be in five years?5. Write their vision in simple phrase: Our community IPM vision will be in five years is: _____ _____ _____ _____ _____ _____

Worksheet

Individual worksheet of vision

Vision milestone

Direction: For each of following, develop a brief, simple phrase

1. What will your primary ecological system be in five years?

2. What will your product (quality, quantity, and kind of plant) be in five years?

3. What will your primary market and price be in five years?

4. What will your primary farmer organization be in five years?

5. What will your primary science been developed in five years?

6. What will your agriculture policy be in five years?

7. What will your farmer's role be in five years?

My Community IPM vision will be in five years is:

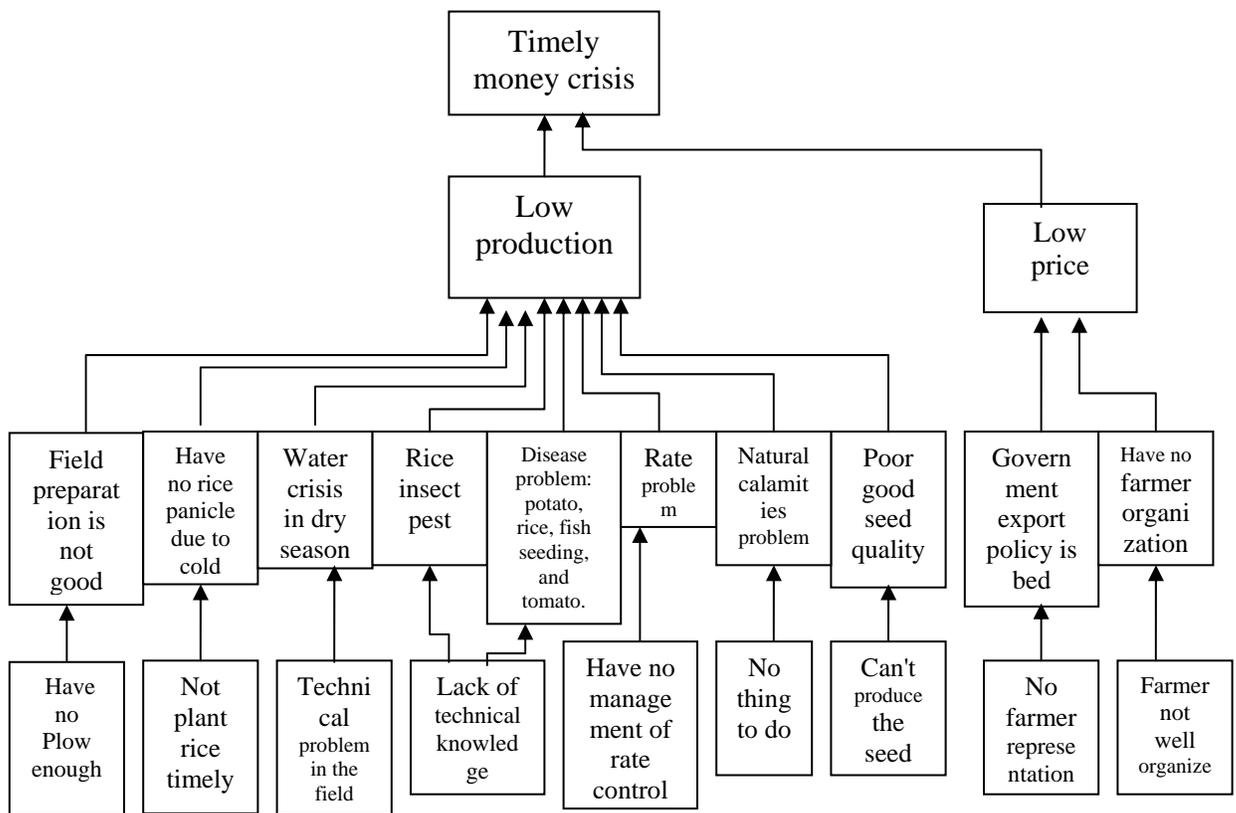
3. Problem identification and analysis

<i>Preface</i>	A planning is created to solve the problem. So, identify the problems is the important step of planning, because if we know what the problems that we pose, we will easy to rise the solving idea. Usually problems doesn't available by own self. That connected with other problem in any connection. But cause and effect connection is important in this planning to look for what the root of the problem.
<i>Objective</i>	<ul style="list-style-type: none"> ❑ Available of problem tree that produced by participant ❑ Participant can identify and analyze their problem
<i>Material</i>	Large papers, number of pieces of card (4x number of participant), art lines, glue, push pins, lack band.
<i>Time</i>	180 - 240 minutes.
<i>Procedure</i>	<ol style="list-style-type: none"> 1. Preparation: be prepared the tools e.g. many pieces of cards, a number of art-line, some of large paper on soft board, the glue, and pushpin 2. Sharing ideas about what does problem mean? Then make consensus about problem perception. 3. Ask participant to think about three important problems that they pose, and write on the card by them selves in the simple negative complete sentence. Ask them to put their problem cards on the stereo-form (soft board) with pushpin.
	<p style="text-align: center;">Example: Agriculture policy unfavorable for farmer. Farmers don't know how to build farmer science.</p>
	<ol style="list-style-type: none"> 4. Participant to classify their problem statement and clarify to make clearer, so, no many interpretations for a statement. 5. Ask participant to choose the main problem of all problems that they had written to start problem analysis activity. 6. Ask participant: why that problem was happened, what is caused, and what the effect of that problem. Look at the problem cards that able on soft board, then test problem connection each other and discuss what kind of that connection: cause, effect, or explanation.
	<div style="display: flex; flex-direction: column; align-items: center;"> <div style="display: flex; align-items: center; margin-bottom: 10px;"> <div style="margin-right: 20px;">Effect</div> <div style="border: 1px solid black; padding: 5px; text-align: center;">Farmer didn't sustain</div> </div> <div style="margin-bottom: 10px;">↑</div> <div style="display: flex; align-items: center;"> <div style="margin-right: 20px;">Cause</div> <div style="border: 1px solid black; padding: 5px; text-align: center;">Agriculture policy unfavorable for farmer</div> </div> </div>

- ❑ Put the cause below the effect, the effect above the cause, and explain behind the own statement
- ❑ By the way, test all of the problem cards till each card lay in the certain relation position as possible as.
- ❑ Glue the cards then connect by arrow line from the cause to the effect.
- ❑ The problem tree is available
- ❑ Move the problem tree and put on the other side of the space

The Mirzaphur Farmer Problem Tree

An example

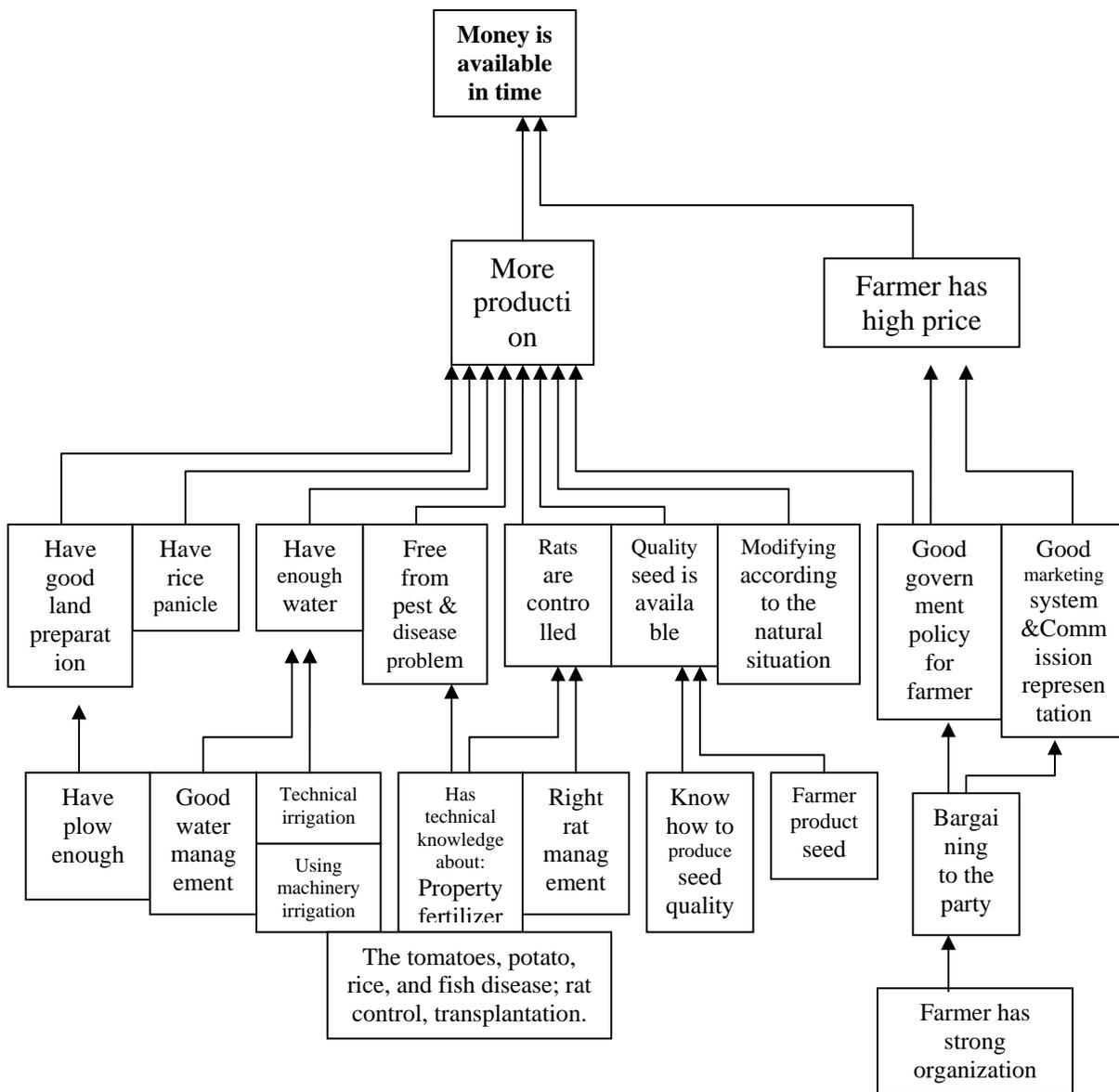


4. Goal analysis

<i>Preface</i>	Goal analysis is an effort to look for how does relationship among the goals. An achieving the goal will be effect to another goal. This activity to analyze the relationship of activity and result of the goals.
<i>Objective</i>	<ul style="list-style-type: none">❑ Available goal phrase as systematically as bas on the problem.❑ Available the goal tree, that describe relation unity of all the goals.
<i>Material</i>	Large papers, a number pieces of cards, art line 70, glue.
<i>Time</i>	90-120 minutes
<i>Procedure</i>	<ol style="list-style-type: none">1. Preparation: look the preparation of the last activity (problem analysis activities)2. Tell participant that the problem is opposite of the goal or purpose, and the problem is a condition that will not to be. That's way the problem statement is expressed by negative sentence, the purpose statements is expressed by positive sentence.3. Now, ask participant to write the opposite of the problem statement. From negative sentence into positive sentence. Distribute that job to all participants, so, all of participant has a job: write the goal statements.4. Participant put their goal statement at the soft board by pushpin on the similar position of the problem tree.5. Test the relationship of each goal statement with other by input-output relation or activity and result connection. Input output connection is the close relationship of two variables.6. Put the input bellow the output variable till all of the goal statement lay on the certain position.7. Glue all the cards then make arrow line from the input variable to the output variable.8. That is the example of the goal tree.

The Mizaphur Famer Goal Tree

An example



5. Alternative analysis

<i>Preface</i>	Alternative analysis is the method to choose the best alternative of many alternatives that resulted by goal analysis. All of the alternatives will be tested by certain criteria.
<i>Objective</i>	Available criteria of measurement for decide an alternative that agreed by participant.
<i>Material</i>	Founded any alternative as a program that will be executed.
<i>Time</i>	60 minutes.
<i>Procedure</i>	<ol style="list-style-type: none"> 1. Ask participant:" What is all of the goals will be done in three or five years? If that's okay, make the sequences of execution, which is to do the first then the second, etc. But if all of the goals does not possible to do, ask participant to define which is the goal level and which is the purpose level then analyze that goal by certain criteria. 2. Ask participant to evaluate that purpose level base on criteria and make the ranking. Example: very good (5); good (4); enough (3); bad (2); worst (1).

Alternative analysis matrix

Criteria	Purpose I	Purpose II	Purpose III
Contribution to the goal	<i>Very strong (5)</i>	<i>Strong (4)</i>	<i>Strong (4)</i>
Manpower & skill	<i>Too enough (5)</i>	<i>Enough (4)</i>	<i>Able (3)</i>
Fund resources	<i>Easy & enough (5)</i>	<i>Not easy but enough (4)</i>	<i>Difficult (2)</i>
Time spent	<i>Short (4)</i>	<i>Very short (5)</i>	<i>Medium (3)</i>
Total	19	17	12

3. Make the conclusion which is the first priority or the first alternative by discussion, then take the purpose and all of activities that relate it
4. See example below (table 2).

Table 2. Alternative analysis

Results /purpose	Contribution to the goal	Skill, man power	Technology	Fund resource	Time spent	<i>Total score</i>
1. Have a good land preparation	5	4	3	3	3	(1) 18
2. Have rice panicle	5	3	3	3	3	(3) 17
3. Have enough water	5	3	3	2	3	(4) 16
4. Free from pest and disease	3	2	2	2	2	(8) 11
5. Rat controlled	4	3	4	3	4	(1) 18
6. Good seed	5	3	3	2	3	(4) 16
7. Modifying to the natural situation	3	3	3	3	3	(6) 15
8. Good government policy	3	1	2	2	1	(9) 9
9. Good marketing system & transportation	3	3	3	3	2	(7) 14

By the way, participant created the rank of alternative based on five criteria. In that case, they have nine ranking as below.

- 1) The first is have a good land preparation.
- 2) The second is rat controlled,
- 3) The thirst is have rice panicle,
- 4) The forth is quality seed is able in time,
- 5) The fifth is have enough water,
- 6) The sixth is modified and adopted according to natural situation,
- 7) The seventh is good marketing system and have representative commission,
- 8) The eight is insect pest and disease free
- 9) The ninth is good government policy

6. Program matrix

<i>Preface</i>	Program matrix is short description of program or project that explain why to do the project, what is the purpose will be reach, what is the result that will be get, how to get it, what is the assumptions that influence that program and what is the indicator of successfulness. Program matrix is created based on the goal tree.
<i>Objective</i>	<ul style="list-style-type: none"> ❑ Participants produce the program matrix of the alternatives. ❑ One, two or three of programs matrix, depend on how many alternative has been fixed.
<i>Material</i>	Large papers, art line 70,
<i>Time</i>	120 - 180 minutes.
<i>Procedure</i>	<ol style="list-style-type: none"> 1. Tell participant that we will put the alternative into the program matrix. Program matrix is resume of the program planning that explain the structure of logical program. The program matrix is consistence of the goal statement, the purpose statement, the results, and the activities. 2. Each level of the logical structure being explained by indicators of successfulness, the evidence resources, and what the assumptions of that level. Assumption is the out side situation that influence the successfulness of the program. 3. Example, if the activity has done and the assumption wasn't able, the results would be get. If the results had got and the assumption was going on, the purpose would be get. If the purpose had got and the assumption was going on, the goal would be touch. 4. The program matrix form as below

Program matrix

Program strategy	Indicators of successfulness	Evidence resources	Important assumptions
The goal			
The purpose			
The results			
The activities	Frequency	When	Budget
			Coordinator

Program matrix of farmer income rising
An example

Program Strategy	Indicators of successfulness	Tools of evidence	Importance assumptions
Goal Money is available in time, or income rising	<input type="checkbox"/> Able to use quality seed <input type="checkbox"/> Can apply fertilizer in time <input type="checkbox"/> Have good cloth <input type="checkbox"/> Can develop housing condition <input type="checkbox"/> Have hand pump <input type="checkbox"/> Good health <input type="checkbox"/> Have irrigation machinery		
Purpose 1. More production 2. High price	<input type="checkbox"/> Fish production increase 10 % <input type="checkbox"/> Wheat increase 10 % <input type="checkbox"/> Rice production increase 100 kg per 33 decimal <input type="checkbox"/> Mustered increase 8 % <input type="checkbox"/> Other crops increase 5 % <input type="checkbox"/> The price increase 10 %		No global dramatic change
Results 1. Land preparation is good 2. Rat controlled 3. Have rice panicle 4. Quality seed is available 5. Have enough water 6. Modified & adopted to natural situation 7. Good marketing and commission system 8. Insect pest and disease free 9. Good government policy	<input type="checkbox"/> Field rice is soft <input type="checkbox"/> No damage symptom in the field <input type="checkbox"/> No disorder in panicle initiation <input type="checkbox"/> no need purchase seed from vender <input type="checkbox"/> healthy plant and more yield <input type="checkbox"/> have water in the land <input type="checkbox"/> no damage due to calamities <input type="checkbox"/> short crop /alternative cultivation <input type="checkbox"/> fish cultivate pond <input type="checkbox"/> get sufficient price increase 10 % <input type="checkbox"/> market under in farmer <input type="checkbox"/> save time <input type="checkbox"/> no damage symptom <input type="checkbox"/> no need purchase pesticide <input type="checkbox"/> save human health, natural enemy <input type="checkbox"/> get reasonable price <input type="checkbox"/> service worker coming to community <input type="checkbox"/> well communication and transportation		Registered book Observation and monitoring report Compare before and after treatment Weight yield
Activities	When do it	Who take responsible	How many dollar
1. a. to make good field rice b. joint to buy cows and sharing plow	November 1998 - 99	Mr. Hafizar, Mr.Sahidul, Mr. Samad.	100
1. to manage rat in the field	Continue start on November,	Mr. Toeyzuddin, Mr. Sandis	200

	99	Mokles, Mr. Yousus.	
2. a. to timely cultivation b. using technology that farmer have jointly and individually	From now to continue	Mr. Mojur rahman, Mr. Abu Hana, Mr. Tolebuddin.	– 100
3. a. to preserve seed b. to learn how to produce good seed c. to produce good seed	From now to continue	Mr.Taezuddin, Mr.Aawan Husen. Mr. Salahuddin	125 75 350
4. a. to manage the water in the filed b. using machinery	Continue	Mr.Toeyzamal Hossein, Mr. Sanaun, Mr. Shamu	– –
6. a. using many crops varieties b. to plant dike with short variety	Continue	Mr. Kasirudin, MrLutfarrahman, Mr.Khanseed	50 50
7. a. to bargain the party b. to push farmer representative in market commission	Election time	Mr. Mutthaheer Hossain, Mr.Mannar,	–
9. to organize the farmer	Continue	Mr. Endadul	100
8. a. to study transplantation b. to study tomato disease c. to study insect pest d. to study potato disease e. to study fish disease f. to observe the field regularly g. to apply learning results	Continue to 2001	Mr. Bablut Afazuddin. Mr.Rizaul, Mr. Bisaj	50 50 50 50 75 – –
Total budget			US \$ 1 425*

* The budget will be resulted after necessity analysis.

7. Stake holder analysis

<i>Preface</i>	Stake holder analysis is needed because that program will do in a certain situation, not in empty space. In reality, the program has connection to other group. They want to be success or fail, and of course they will contribute to this program, good contribution or bad, big contribution or small, important contribution or less. That is depends on what they have. So, stake holder analysis will be describe and define who they are, what are they potential, what are they will contribute and what are their expectation to the program. By the way, we will build program organization and distribute the job.
<i>Objective</i>	<ul style="list-style-type: none"> ❑ Participant know who are they, what are their capability, what their hope to the program and what their contribution for the program. ❑ Distribution of job among participant to do program.
<i>Material</i>	Large papers, art line 70.
<i>Time</i>	60-90 minutes
<i>Procedure</i>	<ul style="list-style-type: none"> ❑ Urge participant to identify whose will concern to the program and who will involve in the program (participant), describe what is their capability about, what is the role that they want to involve it, and what they expect toward program successful. ❑ Ask participant fulfil their dates into the table, then identify the outer. Make the role table

Table 3. Stake Holder Analysis

Stake holder	Potentiality/ capability	Expected contribution	Their Expectation to the program	What our suggestion
1. NGO	Have skilled staff, idealism, technical, information, methods.	Practical guidance, training, learning, science method, more information.	Farmer participation actively, farmer living standard increase, and sustainability.	Join with them
2. Seed vender and fertilizer dealer	Quality and poor seed, good and bad fertilizer, promote pesticide.	Good seed, fertilizer, reasonable price, timely seed	High price, more customer, profit, farmer depends on vender.	Criticism to them.
3. farmer group members of FFS	Rice and fish plot, leadership, study plot, experiment, technology.	Sharing experience join activity, organizer, trainer,	Farmer organization, sharing ideas- experience, and welfare.	Farmer should organize the program by them selves
5. Bank	Credit source, man power	Interest from credit, constituent.	Regular repayment of credit investment	Criticism how many %.
6. Agriculture department	Skill manpower, expertise, seed, fertilizer, training, material, but farmer don't know	Some technical information mainly from radio and TV	Farmer don't know what they want to the program successfulness	Ask them to assist us.

9. Program Organization

<i>Preface</i>	If some works or some end will be reached together by a number of individuals, we need an organization. The program we planned need any people to do it, and any works should be done as unity and systematically to get purpose of program. So we have to know what kind of works will be done, who will take responsibility, when the work will be done.
<i>Objective</i>	Program organization created by participant. Job distribution among participant and time schedule of program.
<i>Material</i>	Large papers, art line
<i>Time</i>	120 minutes
<i>Procedure</i>	<ol style="list-style-type: none"> 1. Tell to participant that we had identified about capabilities, and the others that will involve in this program. The program activities consist many works that should being a unity. So we need to identify what kind of works and who will take responsibility according to their capability. 2. Ask participant to identify what is functions should be able to do program, and identify what the relationship among the function, be discuss about the person that will take care in a certain function base on the role analysis results. Make the table of structure function and job description (see the table 4). 3. Describe relationship among the functions in the program: what is responsible among them each other, what kind of function to each other: what they want to find from other, and what they give for other (see table 5)

Table 4. The Function and responsibility

Jobs	Responsibility description	Who is she/he
Leader/coordinator		
Secretary		
Financing		
Executives: 1. Water management 2. Coordinator of farmer studies 3. Seed production 4. Negotiator to party 5. Rat, pest control manager		

Table 5. Relationship

		Leader	Secretary	Financing	Water manager	Coord. farmer studies	Negotiator	Rate control manager	Farmer
Leader	What will given for.. What will taken from								
Secretary	What will given for.. What will taken from								
Financing	What will given for What will taken from								
Executives: Water manager	What will given for What will taken from								
Coordinator of Farmer studies	What will given for What will taken from								
Seed production	What will given for What will taken from								
Negotiator to party	What will given for What will taken from								
Rate control manager	What will given for What will taken from								
Farmer	What will given for What will taken from								

10. Necessity analysis

<i>Preface</i>	Naturally, we have some natural resources, some thing used, and limited money. We can use all of resources that we have as possible as, to reduce financial spending. Necessity analysis of program is how to fix what kind of and how many material, man power, tools that be able to do program, and how to find it, then how much money that we have to spend.
<i>Objective</i>	<ul style="list-style-type: none"> □ Participant being aware natural resources meaningful to do program. □ To fix how much program budget and how to get it.
<i>Material</i>	Large papers, art line, pieces of card
<i>Time</i>	60 - 90 minutes
<i>Procedure</i>	<ol style="list-style-type: none"> 1. Invite participant to fix what is needed to do each activity, and how to get it and how much money that will be spend, 2. Make table of necessity as below

Table 5. Necessity analysis

Activities	Necessity	How to get it	How much money
1. Rat control in One block	100 Bamboo	One person one bamboo	0
	25 mp.,1 day	Volunteer	0
	10 dogs,1 day logistic	Farmer contribution	0
2. Water management	2 mp.,1 week	By budget	\$ 100.
	200 p. cement	By budget	\$ 70.
	50 m of sand, etc	By budget Find from river	\$.... \$.....
Total			\$

3. To discuss finance resources and how to get it. Invite participant to do that, then write their ideas on the matrix as below.

Table 6. Fund resources analysis

Resources	Potentiality	How to get	Expectation
1. Districts	Big	Proposal	40 % of budget
2. Village	Small	Discussion	10 % of budget
3. Farmer	Enough	Awareness	25 % of budget
4. Funding	Not to small	proposal	25 % of budget

11. Time schedule

- | | |
|------------------|--|
| <i>Preface</i> | Time schedule of program is the last of planning, then starting to implement the program. In this step we have to fix what kind of work in detail when will be do and who will do it, step by step. |
| <i>Objective</i> | Time table of program |
| <i>Material</i> | Large papers, art line. |
| <i>Time</i> | Depend on kind of activity and how many jobs. |
| <i>Procedure</i> | <ol style="list-style-type: none"> 1. Device participant into any groups according to how many activities that will be done, or how many persons take responsible. 2. Ask each group or responsible of activity to make detail works, and ask them to fix when they will do it 3. Make time schedule as below, then ask them to write their action plan in the time table form. |

Activities	1	2	3	4	5	6	7	8	9	10	11	12
1. Rat control:												
a. Action plan discussion		■			■							
b. Cut the bamboo into short stake			■		■							
c. Working together in the field			■			■						
2. Water management												
a. observation of irrigation canal	■											
b. maintenance of canal	■											
c. regulation time of irrigation	■											
d. distribution of water		■					■					
e. distribution monitoring			■		■							
f. evaluation					■							