



Research Proposal on:
Soil Water Conservation Techniques in Spate Areas
Using Traditional Knowledge

Case study: Tihama region

Team of research study:

- | | |
|--|----------------------------|
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Water Challenges In Yemen

- The agricultural production represents 21% of national return of Yemen, where it consumes 90% of the water. While the farmers depend upon traditional irrigation systems which has low efficiency (reach 35%).
- A rapidly consumption of groundwater in Tihama Wadis, due to this reasons, especially after involving the banana crop to the cropping pattern in Wadi Zabid.
- Therefore, the soil conservation methods that aim to maximize profiting from seasonal flood water should be applied to increasing soil holding capacity.
- A lot of tradition knowledge and experiences of Farmers in soil moisture conservation in spate areas need to be docummented.

Objective of the pilot research

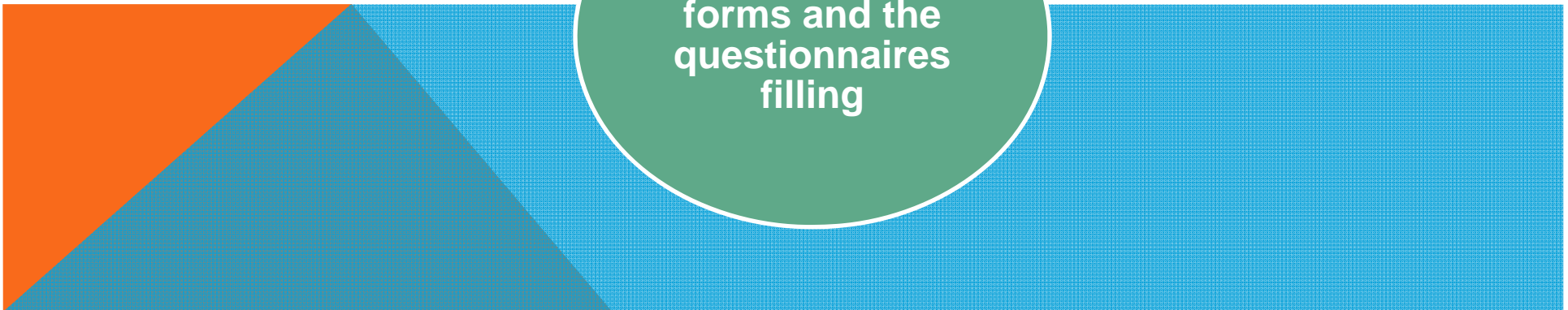
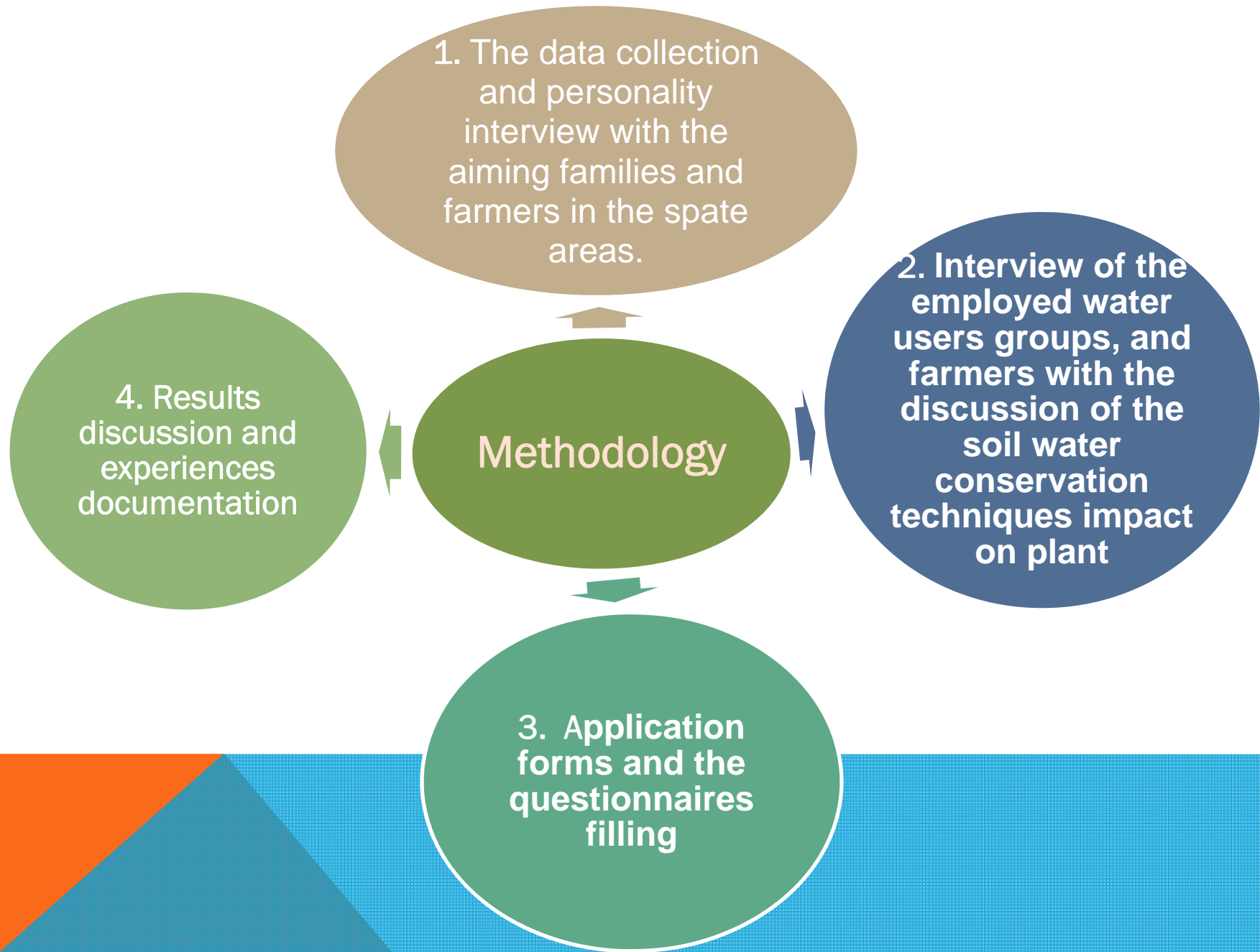
This research aims to document the skills and local knowledge used by farmers to preserve soil moisture, and define the soil water conservation techniques that is applied in spate areas, and its impact on the flood water saving, and maximizing the benefit of rain and flood water.

- **Sub objectives:**

1. Specific study for documenting the skills and local knowledge used by farmers to maintain the soil moisture as long as possible.
2. To find and documents of the soil water conservation techniques applied in spate areas.
3. To define the impact of soil water conservation techniques on the crops productivity in spate irrigation areas.
4. To study the impact of the soil water conservation techniques in the improvement of the living livelihood and stability of the inhabitants in the spate areas.

1. Weeding : after one month clean the weeding
2. Al aasig: Plowing the farrow spacing to put the soil around the plant legs after one month
3. Alkhaf: decrease the number of planting to be not croided planting , after 20 -25days.







**Mulching Techniques For Soil Water Conservation
And It Impact In Groundwater Conservation
Case study: Wadi Zabid - Tihama region**

Proposal for MSc. Degree research

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General

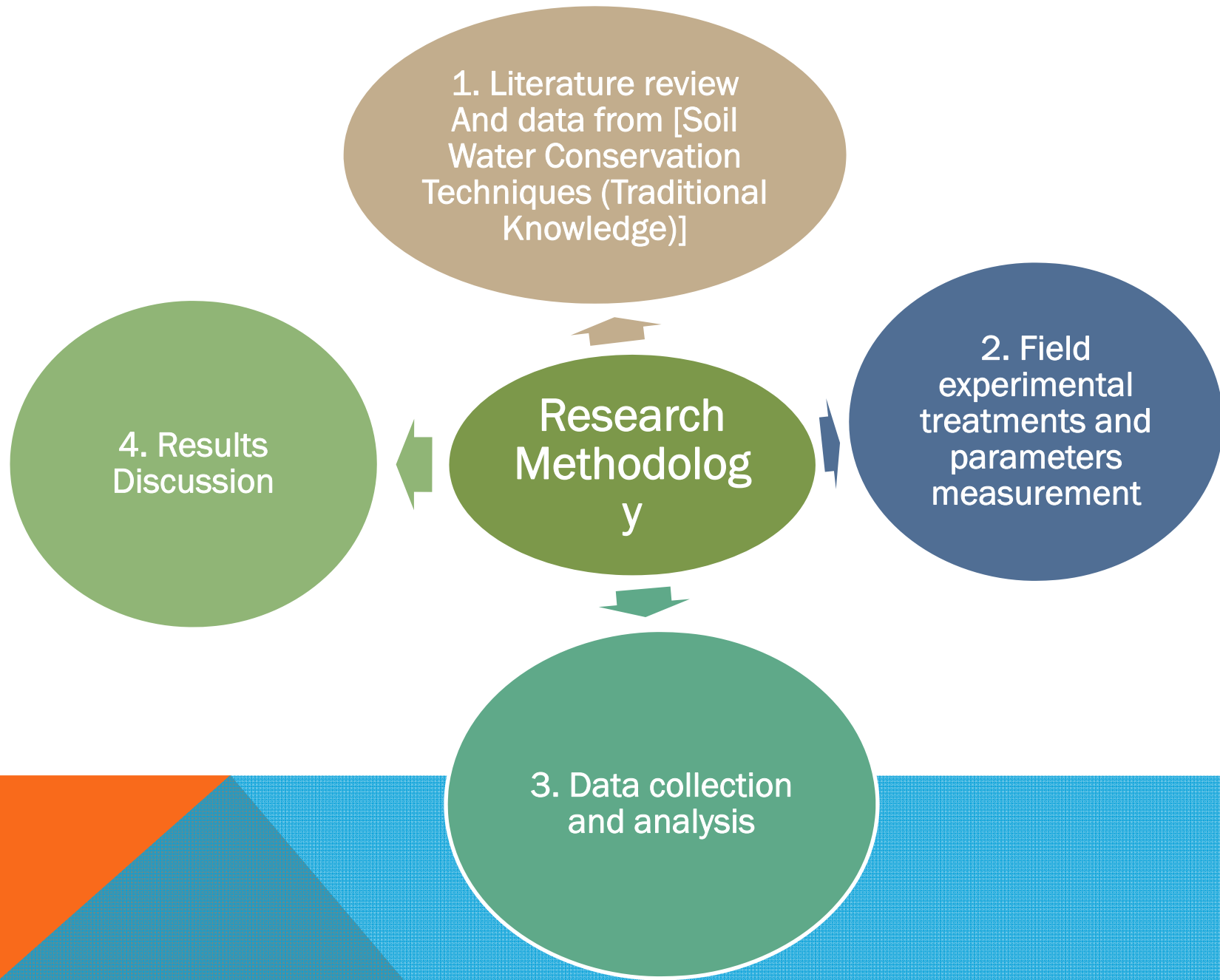
- The methods of soil conservation will be conserved the soil moisture content, which is extremely important especially against evaporation from soil surface.
- Mulching and polymers techniques are most two effective methods **to conserve soil moisture, increase irrigation interval, maximize profitability from rain and flood water, and reduce abstraction from groundwater.**
- **The soil mulching benefits are:** Avoiding soil moisture loss by evaporation, increase irrigation interval period, control weeds growth, conserve soil fertility from wind erosion, and provide homogenous soil temperature and increase crop yield quantity and quality.
- **The polymers techniques benefits are:** Enhancing soil capacity in absorbing and holding moisture content, deliver crop water requirement within appropriate rate, suitable to provide fertilizers, not toxic for soil and plants and does not results any root's diseases.

Research Objectives

The main research objective aims to assess the current conventional methods used by Tihama farmers for increasing capacity of soil in holding its moisture content, and conduct a field experimental using available local material that could be suitable to cover the soil as mulching techniques and introduce a low cost dual effect mulching plus polymer technique.

Sub - Objectives:

- Defined Tihama farmers practices for soil moisture conservation, and increasing soil holding capacity for its moisture content gained from rain, flood water, and groundwater (as traditional irrigation water) in spate areas
- Assess available local materials that could be used in covering soil moisture as local mulching techniques,
- Assess plastic (polyethylene) in soil mulching as mulching techniques,
- Introduces a new dual effective mulching technique with polymer for conserving soil moisture content,
- Conduct a comparison field experimental between different soil mulching techniques by monitor each impact on conserving soil moisture, prolong irrigation intervals, increasing irrigation water use's efficiency and yield quantity and quality.
- Define the best techniques to be applied in different spate areas in Tihama region



Research Methodology (approach):

1) Analysis all the skills and knowledge used by farmers to maintaining the soil moisture in the areas irrigated with rainwater , floods water, and groundwater in Wadi Zabid - Tehama from the data obtained from the study:

[Soil Water Conservation Techniques in Spate Areas (Using Traditional Knowledge)]

1) Conduct field experiments in field which is mainly irrigated from spate irrigation system, and complimentary irrigated from groundwater (traditional irrigation).

2) These field experiments will be conducted for planting a vegetable crops (potatoes) with the application of soil cover techniques using (local materials from the local environment and other industrial materials)

Research Methodology (approach Cont.):

➤ Field experimental treatments: using available local materials:

- ✓ Cover the soil using the agricultural residual
- ✓ Cover the soil with manure.
- ✓ spate irrigation with soil cover using plastic mulching (polyethylene).
- ✓ spate irrigation with soil cover using dual mulching plus polymer (pads),
- ✓ spate irrigation without any soil moisture conservation technique (control treatment).

➤ Research Parameters Measurements

- ✓ Soil moisture content at three different specific depth will be measured (depending on the crop growth periods) with three readings between each two irrigation Processes.
- ✓ Soil temperature at specific depths will be measured (depending on the age of the crop periods) by three readings between each two irrigation Processes.
- ✓ All variables which will be used in the calculation of the Irrigation water efficiency.

Research Methodology (approach cont.):

➤ c) Calculated Parameters

Several parameters which are affected the soil moisture conservations will be calculated from the experiment data for every type of mulching and control treatment, as follows:

- ✓ Irrigation water use efficiency (production quantity / added water irrigation)
- ✓ Water saving quantity
- ✓ Yield production quantity
- ✓ Yield production quality
- ✓ Water crop productivity

➤ d. The experiment Constant parameters

- ✓ Soil moisture content before each irrigation operation,
- ✓ Amount of irrigation water applied for each irrigation operation,
- ✓ Field dimension for each treatment,
- ✓ Cultivated crop and agricultural processes
- ✓ Soil and climate





There is different positive impact and advantages depends on types of soil mulching: if it is organic or nonorganic



Organic cover : as planting waste, trees leafs, wood sawdust, journal and news paper, and manure





Plastic soil Mulching

Different Experiments with Organic and non Organic cover:

- ❖ Planting with traditional irrigation with organic cover:
 - Planting waste (planting straw) , Traditional fertilizers (manure)
- ❖ Planting with traditional irrigation with non-organic cover:
 - Plastic cover (polyethylene) , Polymers cover
 - On experiment without any cover (stander)





Plastic soil Mulching



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The Business model Canvas for Country Networks of SpNF - Yemen

<p>Main objective in next five years: To developed country Network SpNF which include WUAs communication and cooperation (Farmer to Farmer communication and cooperation) , WUAs communication and cooperation with partners and related departments, and communication between WUAs and local, regional, and international donors.</p>		<p>Main system of working</p> <ul style="list-style-type: none"> - Review all WUAs and defined the contact person/ (2or 3)persons - Establish SpNF in the country. - Activated the SpNF in all spate areas in the country 			
<p><u>Partners:</u> NIP, MAI (GID), SFD, TDA, WUAs, and Water councils</p>	<p><u>Key Activities</u></p> <ul style="list-style-type: none"> - Developed cooperation and coordination between WUAs and farmers in spate areas to exchange knowledge and experiences locally , nationally and international. - Developed best way of communication between WUAs and farmers to farmers, and partners - Documentation all experience in wadis - Developed trainings for WUAs members and farmers in different field (awareness, communications, and exchange knowledge and experiences) - De veloped communication between WUAs/ farmers and local, regional, and international donors 	<p><u>Value Proposition/ Service to Different Groups</u></p> <ul style="list-style-type: none"> - For Nip, MAI (GDI) - SFD and TDA - For WUAs and irrigation water councils - WUAs members - SpNF members - Farmers - Local population - Related departments and authorities 	<p><u>Customer Relationships</u> Give financial support and advisors from partners and donors to WUAs, and farmers, and have water saving, increase crop productivity, increase products marketing. In addition, to the documentation of good knowledge and experiences and share it all of them</p>	<p><u>Customer Segments</u> All spate areas beneficiaries</p>	<p><u>Beneficiaries</u> WUA's members Farmers, All partners Local population Related departments and authorities</p>
<p><u>Governance (including link with WUAs and preferred official/ legal status)</u> Law No. 1 for the Year 2001 concerning Associations and foundations, and Law No. 39 for the Year 1998 concerning collaborative Associations and Federations</p>	<p><u>Key Resources and Assets</u></p> <ul style="list-style-type: none"> - SpNF surface for farmers - WUAs Surface for farmers - Irrigation surfaces fees - Support from related ministries, authorities, and departments. - Local , regional, and international donors 	<p><u>Channels/ outreach</u> Communication by Telephone Whats up, SMS, email if available, and making meetings, workshop, trainings, and conferences</p>			

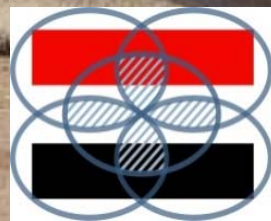
The Business model Canvas for Country Networks of SpNF - Yemen

<u>Cost structure (estimated budget and breakdown)</u>		<u>Outcome & Impact</u>	<u>Revenue Streams/ Sources of Finance</u>
<ul style="list-style-type: none"> - Developing country data base of WUA's (9500 USD) 	USD 9500	<ul style="list-style-type: none"> - Established the SpNF 	<ul style="list-style-type: none"> - SpNF surface for farmers
<ul style="list-style-type: none"> - Introducing SPN & WUA's Network to different farmers and WUA's members in different Spate regions in the country by making meetings, workshops, lectures.....etc locally and regional . (6 meeting (18000 USD)) 	18000	<ul style="list-style-type: none"> - Established communication and cooperation between WUAs members and farmers in different regions with partners and donors. 	<ul style="list-style-type: none"> - WUAs Surface for farmers
<ul style="list-style-type: none"> - Knowledge development of WUA's member and farmers in different Spate regions in the country by organizing and implementing awareness short training (3 trainings (24000 USD)) 	24000	<ul style="list-style-type: none"> - Documented the good experience in all country spate regions 	<ul style="list-style-type: none"> - Irrigation surfaces fees WUAs areas
<ul style="list-style-type: none"> - Organize cross-regions farmers' knowledge and experience sharing workshop (3 workshop (24000 USD)) 	24000	<ul style="list-style-type: none"> - Exchange knowledge and experiences locally between WUAs members and farmers, and 	<ul style="list-style-type: none"> - Support from related ministries, authorities, and departments.
<ul style="list-style-type: none"> - Organize cross-country farmers' knowledge and experience sharing workshops (one time (15000 USD)) 	15000	<ul style="list-style-type: none"> - nationally between different regions, and international between partners countries 	
<ul style="list-style-type: none"> - Prepare at least 6 practical notes and communication product for each research theme: Water Use Efficiency and conflict management , Managing soil moisture , and water harvesting from roads. (3000 USD) 	3000		
<ul style="list-style-type: none"> - Implement at least two action researches which will solve some of the WUA's water problems in the spate areas (one in every region). (20000 USD) 	20000		
<p style="text-align: center;">Total budget in USD</p>	113500		

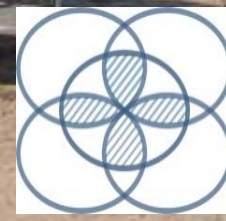
Many thanks for your
attention and participation



Water and
Environment Centre



Spate Irrigation
Network Yemen



Spate Irrigation
Network



IFAD

Enabling the rural poor
to overcome poverty

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