Feasibility Study

Strengthen biodiversity and resilience of rural communities through Farmer Managed Natural Regeneration (FMNR) and improving quality and marketing of coffee and fruits

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Acronyms

AFS	Agroforestry systems
AREA	Agriculture Research and Extension Authority
BAP	Biodiversity Action Plan
BMZ	Federal Ministry for Economic Cooperation and Development
CERF	Central Emergency Response Fund
CSI	Climate Smart Initiative
CV	Curriculum Vitae
DRC	Danish Refugee Council
eg	For example
etc	Et cetera
FAO	Food and Agriculture Organization
FGD	Focus Group Discussions
FMNR	Farmer Managed Natural Regeneration
FSL	Food Security and Livelihood
GIZ	German Agency for International Cooperation
IFAD	International Fund for Agricultural Development
IMC	International Medical Corps
IPM	Integrated Pest Management
IWM	Integrated Weed Management
KIIs	Key informant Interviews
M&E	Monitoring and Evaluation
MAI	Ministry of Agriculture and Irrigation
MCS	Monocropping systems
MEAL	Monitoring, Evaluation, Accountability, and Learning
MIR	Mid-Infrared (MIR)
NFDHR	National Foundation for Development and Humanitarian Response
NGO	Non-Governmental Organization
OCHA	Office for the Coordination of Humanitarian Affairs
OM	organic matter
pH	potenz Hydrogen
PhD	Philosophiae Doctor
PRA	Participatory rural appraisal
Qty	quantity
SCMCHA	Supreme Council for the Management and Coordination of Humanitarian Affairs
SFD	Social Fund for development
SMEPS	Small and Micro Enterprise Promotion Service
TOR	Terme Of Reference
VIH	Vision Hope International
WASH	Water, Sanitation and Hygiene
WS	Workshop
WUAs	Water User Association
WUGs	Water User Groups
YFCA	Yemen Family Care Association
YHF	Yemen Humanitarian Fund
YR	Yemeni Rial

1 Executive summary

This study aims to provide solid foundation for developing the concept of the project planned by VHI. The information and figures provided by the study will build the main reference to develop the final concept and log frame of the project. Three workshops have been conducted in the three targeted governorates (Hajjah, Al-Mahwit and Lahj) including 89 participants from the agricultural offices, local authorities, SCMCHA at governorate levels, and representatives of universities and coffee farmers. Key Informant Interviews (KIIs) and Focus Group Discussions (FGDs) have been conducted in the targeted governorates and in Sana'a and Aden to verify data and information gathered during the workshops and to address new relevant technical issues that were not possible to be addressed during the workshops. The targeted participants were official representatives, farmers, academic persons and representatives of local authorities as well as National and International NGOs and UN organizations.

It is planned to implement the project using the low-cost techniques of Farmer Managed Natural Regeneration (FMNR) to enhance the conservation of biodiversity of Yemen and for improving quality and marketing of coffee and fruits.

Some Yemeni coffee farmers are practicing some kinds of FMNR activities in their fields (Yafe'e, Lahj Governorate). Other farmers in other locations may have restraints against practicing FMNR activities like pruning in their coffee fields and prefer to practice the FMNR activities with other fruit or agroforestry plants. Both options are possible either in monoculture crops or along with coffee-synergy plants according to the locations and readiness of the farmers to cooperate.

Current challenges of coffee cultivation in Yemen

1. Competition challenges: The competition of qat is ever growing, directly impacting the production potential of coffee and other agricultural crops. The profitability margins of qat are currently far greater than that of other crops.
2. Infrastructure challenges: Remoteness of coffee production areas and limited access to reach market.
3. Organizational challenges: Individual farmers need help organizing themselves into producing and marketing groups.
4. Pest and diseases: The outbreaks of diseases and pests continue to affect coffee growth.
5. Irrigation challenges: Growth is hampered by lack of sufficient water for irrigation as well as the lack of equipment for harvesting rainwater.
6. Post harvest challenges: Poor equipment of post-harvest techniques reduces the ultimate coffee yields.

Coffee marketing is one of the main challenges

Around forty percent of Yemeni farmers sell coffee to merchants from outside their governorates who own private companies. A further 40% of the coffee farmers display their production of coffee beans in the local central markets of the governorate, while about 8.6% of the coffee farmers transport the coffee beans to the central markets in the capital city of Sana'a. Forming marketing groups may help the framers to allocate where to bring their harvested coffee and to optimize the price received.

Therefore, it is necessary to contribute for construction of roads to fields, water sources and markets, rehabilitation of rural market areas by improving of some market structures of coffee and finally, establishing and training of marketing groups for coffee (packing, sorting, storing and marketing).

Assessing the partner

The consultant met the technical representatives from the NFDHR to check their technical capacities for fulfilling the objectives of the project. A joint meeting has been conducted with the leadership of the NFDHR in their main office in Sana'a. NFDH has implemented agricultural projects in the last five years together with YHF/ OCHA, IFAD/ FAO, CERF/ FAO, Direct AidYemen, BMZ/ VHI and with FAO in Hajjah, Al- Dhalee, Taiz, Abyan, Al Hudaydah, Hajjah, Sa'dah and Al Mahwit and Hadramout, respectively. Accordingly, we recommend continued partnership with NFDHR in this project taking into account the recommendation that NFDHR should make short contracts with experts of horticulture in the three targeted governorates

Other partners

During the workshop and the FGD the participants were asked to identify local actors to support and ensure the success of the project activity. The proposals and answers identified the agricultural offices at governorate level, the agricultural and NGOs working in agriculture sector, the local authorities as well as the research institutions and the universities (The agriculture colleges in Sana'a, Abs Hajjah and Lahj).

Opportunities for Yemen Coffee

The three targeted governorate possess many opportunities to develop and improve coffee cultivation with existing beneficial topographical climate factors, remaining good soil fertility and the traditional irrigation networks. There are also official and

organizational efforts emerging in north and south of the country to sensitize farmers for coffee cultivation and marketing operations. The most important opportunities can be summarized under the following headings:

- Coffee is considered one of the promising cash crops in the three targeted governorates. It is noted that there is a trade movement in coffee in the markets in the three governorates due to its quality and good reputation among merchants and owners of private companies.
- Coffee in in the three targeted governorate is grown on terraces with suitable climate and good fertility of soils growing a quality product which generates commercial value. Increased coffee growth can provide great opportunities in terms of creating job opportunities and become a driving force toward the social and economic development in the three targeted governorates and in the country overall.
- There are currently areas where residents depend entirely on coffee cultivation, such as Beit Dhiyab, Beit Al-Maliki, Beit Al-Bashri, Kawkaba, and Masabil in the Hafash district in **Al-Mahwit** and Bani Alawam, Mabyan and Kuhlan Affar in **Hajjah** as well as Yaher, Alhad and Labu'us in **Lahj** governorate.

Evaluation of the planed project against the BMZ Guide to conducting feasibility studies

- The project is relevant to Yemeni development strategies (Agriculture, water and poverty).
- The project is relevant to the new strategy of development of coffee production 2020-2025.
- It is relevant to the international initiatives (UNDP initiative from Qat to coffee, 2022).
- The main objectives of the project are capacity building, awareness and training of the targeted beneficiaries including women and youths focusing on FMNR techniques and improving the institutional structures of cooperatives. This leads to positive impact from the planned results of the project.
- FMNR activities are low-cost interventions with high returns. The allocated funds can be applied efficiently to the planned activities. However, fluctuations in exchange rate of the Yemeni currency should be taken into consideration. The different exchange rate of the Yemeni Rial (YR) in south and north can cause confusion in terms of investments, operating expenses and personnel payments.
- Personal sustainability: Capacity building and training of farmers in FFS as well as distribution of visual awareness materials and visual training manuals are the main instruments of sustainability.
- Cooperative sustainability: Forming or/and empowerment of existing associations and groups (coffee producing – marketing cooperatives/groups, WUAs, WUGs) increase the local ownership and lead to sustainable continued activities.

Recommendations[1]

- Carry out capacity building and institutional organization of the farmers.
- Propose programs and mechanisms to motivate farms to replace Qat trees with coffee trees. This could include providing incentives and support with rainwater harvesting tanks (such actions have been started in Haraz, in some areas Al-Mahwit and in some fields of Dhamar).
- Implement an integrated extension program for coffee farmers (e.g. rural nurseries, regenerative pruning, coffee breeding, pests and diseases management).
- Improve farmers capabilities to manage coffee harvest and post-harvest operations by providing them with drying and packing mechanisms according to location-appropriate specifications.
- Design a technical and advisory guide for coffee cultivation for each governorate. Train a group of farmer-experts to disseminate and apply the content of this guide, provided that the guide includes fruit trees and forest trees associated with coffee.
- Document and disseminate the positive traditional practices and techniques that were applied by Yemeni farmer ancestors in the field of coffee cultivation as well as other useful trees.
- Share new skills and successful experiences among farmers through the formation of cooperative bodies (committees, associations and coffee federations).
- Activate tribal legalization orders called "Maraqum" or "Mahjoor" (customary agreements among rural people that prevent excessive logging or overgrazing in their area) in coordination and cooperation with the general directors of the districts.
- Activate the relevant governmental laws and policies and obtain necessary orders to the security authorities in the local level to implement them.

[1] Detailed activities and related budget please see the attachments

2 Introduction

The humanitarian crisis in Yemen remains one of the worst in the world. Nearly nine years of conflict and severe economic decline are driving the country to famine and exacerbating needs in all sectors. In 2023 according to the Humanitarian Needs Overview (HNO) analysis, 21.6 million people in Yemen are expected to require humanitarian assistance, of whom at least 13.4 million people are assessed to be in acute need[2]. The main effects of the extreme number of people in need are: food insecurity and malnutrition, health, water and sanitation requirements and lack of protection[3].

Developing multiple lines of resilience in agriculture activities are the most effective interventions in the current country circumstances. Introducing new techniques for integrated intervention in agriculture, food security, biodiversity, peace-building and gender roles enhances the options for resilience of rural people and improves the use of their available resources. Adaptation of Farmer Managed Natural Regeneration (FMNR) is one of the new techniques for improving self-help of farmer and rural people in Yemen.

Although conservation of nature and the environment have a long tradition in Yemen, the pressures on natural resources like water, cultivable land and biodiversity are increasing dramatically due to widespread poverty, rapid population growth and outbreaks of armed conflicts. The ongoing conflicts and unstable situation lead to further deterioration of the available natural resources.

The natural biodiversity in Yemen is subject to high pressure due to use and encroachment, as a result of which natural resources are often exploited without regard to sustainability. Different biodiversity and conservation projects have been implemented in Yemen in the past two decades like the World Bank's Rainfed Agriculture and Livestock Project (2007-2015), the Agro Biodiversity and Adaptation (2010-2015), the Smallholder Agricultural Production Restoration and Enhancement Project (2018-2021) projects. The GIZ implemented the project Conservation and Sustainable Use of Biodiversity in Yemen financed by the BMZ in the capital of Sanaa' and Socotra during 2011-2018.

[2] https://reliefweb.int/report/yemen/yemen-humanitarian-needs-overview-2023-december-2022-enar
[3] Ibid

3 Project background[4]

VHI is planning to implement a project in Yemen to strengthen biodiversity and resilience of rural communities through Farmer Managed Natural Regeneration (FMNR) and improving quality and marketing of coffee and fruits. The project is planning to train 1,250 farmers in Hajjah, Al-Mahwit and Lahj Governorates in climate resilient agricultural practices through 100 model plots and farmer field schools. The following table reflects roughly the overall project context.

Project Title	Strengthening biodiversity & resilience of rural communities through FMNR and improving quality & marketing of coffee and fruits in Yemen.
Name of the organization	Vision Hope International e.V.
Financier	BMZ
Partner organization	NFDHR
Project Start	3/1/2024[5]
Project End	4/30/2027
Total Budget	2,500,000 €

3.1 The overall goal of the project[6]

The goal is projected to lead to strengthened biodiversity and resilience of rural communities through FMNR and improving quality and marketing of coffee and fruits in Yemen.

3.2 Interventions

To deal with the above problems the project is planning the following interventions:

3.2.1 Capacity building and institutional organization the farmers

Training and awareness sessions are planned to build the capacity of the farmers and the extensionists. In addition, the project is planning to strengthen the institutional structure of the producing and marketing groups of the farmers by forming of cooperative groups as well as providing technical support to the already existing organizations and groups of farmers.

3.2.2 Forming of cooperative groups and individual monitors

It is necessary to help individual farmers organizing themselves in producing and marketing groups. Therefore, the project will give high priority to this issue and is planning to certain interventions such as:

- Forming of self-help groups.
- Establishment of village nurseries under the leadership of women and youth.
- Selection of successful and competitive young coffee farmers as agricultural mentors.
- Hold community meetings for the exchange of experiences, ideas and suggestions.
- Building the capacity of cooperative societies and the coffee farmers.

3.2.3 Rational use of water for irrigation

The project will give high attention to the rational use of water in the agriculture by:

- **Infrastructure**: Enhances rational access to water resources and improving traditional water harvesting schemes;
- **Water harvesting**: Shallow wells, rainwater harvesting systems, and irrigation structures.
- **Water storage**: Community water ponds, concrete water tanks etc.
- **Decrease groundwater pumping**: Positive impact on recharge of ground water basins.

4 Project information, Summary of Concept of Coffee and FMNR Project in Yemen, VHI still internal document, December 2023

5 Start date might be adjusted; more likely is May 1st or even June 1st 2024

6 It's the descriptive title from the letter of intent; exact wording for the overall goal might still be adjusted

- **Institutional structures**: Forming of Water User Association (WUAs) and Water User Groups (WUGs) for irrigation purposes.

3.2.4 Enhancement the coffee value chain

It is essential to give special attention to the coffee value chain. From production inputs passing on to coffee production, harvest, drying, collection, roasting and marketing, each step can be further improved and enhanced. The project is planning to adopt different interventions such as:

- Encourage establishment of a Facilitation Committee.
- Provide drying beds to coffee farmers to facilitating the post-harvest process.
- Encourage establishment of coffee processing centers.
- Participate in organizing of coffee fairs and harvest celebrations.

3.2.5 Providing of agricultural inputs

The project is planning to provide the baneberries with certain agricultural inputs:

- Provide agricultural materials, equipment, and tools for improvement/maintenance/cleaning (agricultural practices, pest control, pruning, harvesting etc.).
- Distribute coffee and fruit seedlings that are resistant to diseases and pests.
- Providing drying beds, tools and other for coffee farmers for effective and efficient drying of harvested coffee.

4 Purpose and use of the feasibility study

The information and figures provided by the study are to be used to develop the final concept and log frame of the project. The following points reflect the main objectives of the feasibility:

- Provide VHI with a solid foundation for developing and optimizing the project concept, clarifying the prerequisites, opportunities, and risks.
- Assess the current state of the coffee and fruit cultivation sector in Yemen, identify the opportunities, challenges, and risks associated with the proposed project, and evaluate its feasibility from technical, economic, financial, social, and environmental perspectives.
- Identify potential partners and stakeholders who could contribute to the success of the project, including universities, other projects in the field, and local communities.
- Provide recommendations for project implementation, including strategies for overcoming potential challenges and risks. This includes, for example, if FMNR should be implemented at separate locations in the same community, or even on the same fields with the coffee/fruit farming community.
- Estimate the project's costs and benefits, including both financial and non-financial impacts. Provide an overall assessment of the project's potential impact on the coffee and fruit cultivation sector in Yemen, including its potential to improve livelihoods, strengthen resilience, and promote sustainable development, as well as risks of unintended negative impact (do-no-harm).
- Identify the main problem sources and causes in Yemen in the area of coffee and fruit agriculture, and more specifically in the targeted governorates regarding the concepts of the project. The study will gather feedback from stakeholders on the activities that the project is may carry out and the potential project implementation mechanism.

5 Methodology

5.1 Study sequence

To fulfil the objectives of the study, the following table summarizes the activities will be conducted in four sequenced phases namely, design and plan, data collection, analysis and finalizing. Each phase has results leading to reports and deliverables namely: the inception report, the raw data materials, the preliminary findings and the draft and final report. The consultant will analyze the collected data using the SPSS program.

Table1 : The methodological sequence of the study

Phases	Design and plan	Data Collection	Analyzing	Finalization
Activities	Desk review and literature study Preliminary communication between VHI Yemen and the Consultant to clarify and approve terms of study. Designing data collection tools in collaboration with VHI Yemen.	Collection of data by conducting induction workshops in the three governorates; Focus group discussions (FGDs) Key informant interviews (KIIs) Intensive Desk review Field visit to farms and farmers, if possible	Analysis and triangulate of collected data. Assessing preliminary findings and considering key strengths and weaknesses. Summarizing focusing on key findings and recommendations.	Formulation of findings and conclusions. Draft of report of the feasibility study Processing comments and feedback from VHI. Submitting amended reports based on feedback from VHI Yemen.
Deliverables	Inception report	Raw Data Materials	Preliminary Findings	Draft and final of report

5.2 Sampling

Using a conventional sampling calculator[7] was not applicable since it was not possible due to the current country circumstances to reach the number of the sampled targeted farmers. Permits for detailed field survey, if allowed, required 3 to 4 weeks in advance to be apply by SCMCHA. Induction workshops, FGDs and KIIs have covered the information needed for this study.

Three induction WS with 89 participants, 10 FGDs with 45 participants and 29 individual KIIs have been conducted in the three governorates and in Sana'a and Aden (table 2).

Table 2: Conducted WS, KIIs and FGDs and the related numbers of participants

Governorate	**Workshops**	**KIIs**	**FGDs**	
			#	**Participants**
Al-Mahwit	31	21	2	9
Hajjah	28	10		
Lahj	30	22	3	14
Sana'a		11	5	22
Aden		9		
Total	89	64	10	45

5.3 Data management

The collected data and information have been entered in prepared data entry forms. The forms were prepared in advance by the data analyst using excel and SPSS program. Raw data collected during the workshops, the KIIs or FGDs as well as during the field visits in the south have been kept in an extra folder to come back to them during the data analysis to clear any errors.

[7] Like http://www.raosoft.com/samplesize.html

5.4 Desk review and literature study

Desk review and literature studies have been intensive conducted during all study phases and parallel to the study activities. However, the conclusion of the desk review has been focused more to address the following issues:

1. Assessment of the challenges faced by coffee farmers in Yemen, including the impact of climate change, limited access to modern farming practices, poor infrastructure, restricted market access, and low profitability.
2. Identify the areas of potential beneficiaries of the project's interventions at the district and village levels. Understand the specific needs, aspirations, and priorities of coffee farmers in these target areas.
3. Identify interventions that align with the needs, aspirations, and priorities of coffee farmers in Yemen. Evaluate the feasibility and viability of these interventions to support the enhancement of coffee farming practices and livelihoods.
4. Identify potential risks and weaknesses that the proposed project may encounter during its implementation.

Moreover, the following points have been taken into consideration by desk review based on recently conducted study reports:

A. Rapid Value Chain Analysis:

This study has not gone into details of the value chain analysis. Related information for the project has been taken from the newly published comprehensive studies of the coffee value chain analysis conducted by the UNDP and others[8][9]. However, rapid market assessment has been checked to compare the current situation with value chain data conducted recently. The objective was to discover potential opportunities for value-added interventions in the coffee production, processing, and export chain.

B. Policy and Regulatory Analysis:

The study examined the existing institutional framework and policy environment related to coffee cultivation, fruits and agroforestry to explore interventions supporting the three sectors through policy mechanisms. The consultant met with officials to check available regulators regarding production, marketing and export and regulators regarding grazing, cutting down of trees etc.

5.5 The field works

5.5.1 Induction workshops

The participants invited to the WS were official representatives, farmers, academic persons and representatives of local authorities. Main aim of the workshops was deep discussion and exchange of views on the following points:

1. Project concept

- Reflection on the thoughts of the participants regarding the activities that the project may carry out and the project implementation mechanism.
- Identifying the main problems in Yemen around coffee and fruits, and more specifically in the targeted governorates (Hajjah, Al-Mahwit and Lahj) regarding the idea of the project.
- Main concerns and expectations that the participants have during the workshop consultations.
- Partners' commitments regarding project design and project proposal preparation, and subsequently in project implementation.

2. Initial situation and problem analysis, on macro- meso- and micro-levels

- Assess the current state of the coffee and fruit cultivation sector in Yemen, including historical, economic, and international contexts.
- Identification of current problems of the beneficiaries relevant to the proposed project.
- Prioritize the causes of these problems to be addressed in the project.

3. Climate-Resilient Agricultural Practices

- Collection of ideas addressed by the participants regarding climate-resilient agricultural practices.
- Identify and address approaches or results from previous development measures.
- What other circumstances, for example conflict dynamics, must be taken into account in the context.

[8] https://www.scribd.com/document/661259765/VC-Analysis-Qat-Coffee-EN-1-August-2022
[9] https://edepot.wur.nl/589422

4. Farmer Managed Natural Regeneration: Farmer Managed Natural Regeneration to Biodiversity conservation. Discussion with the participants the concept of FMNR, for coffee and fruits but also for associated agroforestry trees and plants:

    - Agricultural best-practices.
    - Pruning to reduce the density of the tree branches.
    - Village nurseries.
    - Propagation by seed, seedlings and cuttings.

5.5.2 The Focus group discussion (FGD) and Key Informant Interviews (KIIs)

The FGDs and the KIIs were complementary actions to confirm data and information gathered during the WS and to address new relevant technical issues that were not possible to be addressed during the WS such as fine data of agricultural practices like certain agricultural practices conducting by the coffee farmers, the intercropping and inter-distance as well as the water requirements for irrigation and the different actions in the coffee value chain.

The targeted groups of FGDs and KIIs were coffee farmers, agricultural departments in the governorate and central levels, development institutions, UN organizations and INGOs working in the sector.

5.5.3 Field visits

The nature of this feasibility study and the time available as well as the current movement restrictions in the targeted governorates mean that the work focused more on data collection from the induction workshops, from the FGD, the KIIs as well as from desk reviews. Accordingly, it was not necessary to conduct intensive farmer interviews through field visits. Nevertheless, field visits in the south in Lahj have been conducted to the coffee production areas in Yafa'a, Yaher,Alhad and labu'us.

5.5.4 Partner assessment

The National Foundation for Development and Humanitarian Response NFDHR is a reputed Yemeni NGO with excellent institutional structure and coverage in most Yemeni governorates and the NFDHR is already determined as a main partner for this project. Nevertheless, it was necessary that the consultant met the technical representatives from the NFDHR to check and verify their technical capacities for fulfilling the objectives of the project.

6 Findings

6.1 Finding by desk review

Intensive literature review was essential to be researched to know more about the benefits and limitations as well as to identify any gaps in evidence of the FMNR and the related planned activities. Throughout the developing world, including the Republic of Yemen, huge tracts of farmland, grazing lands and forests have become degraded to the point they are barely productive[10].

The subsequences are extremely detrimental effect on subsistence farming households and their communities who make up a large proportion of rural populations and who suffer regularly from hunger and malnutrition[11]. Since its inception in Niger in 1983, FMNR has spread across five million hectares or 50 percent of that country's farmlands, and has been the largest positive environmental transformation in Africa in the last 100 years. Since then, FMNR has been introduced in 18 countries across Sub-Saharan Africa, Southeast Asia, Timor-Leste, and most recently India and Haiti[12].

Sustainable solutions to deforestation and food insecurity could be practiced immediately in the 3 million hectares of forest which continues to be lost worldwide every year [13] . Land degradation has reduced the productivity of 23 percent of land around the globe[14]. Main causes include: climate change, conflicts, external and internal migrations and severe food insecurity. Introduction of FMNR along with other low-cost sustainable agriculture practices has been proven to improve food security and resilience for smallholder farmers and their families[15].

Furthermore, an integrated FMNR approach has proven to significantly contribute to improving livelihoods in many communities[16] . FMNR is currently practiced across more than 25 countries[17]. FMNR costs are significantly cheaper than tree planting schemes and have a 100 percent survival rate compared to variable rates for planted trees, making the technique a valuable investment[18]. Such an intervention allows even a resource-poor farmer to adopt and practice FMNR, agroforestry and other crops and permanent cultures like coffee and fruits. Further, it gives individuals and community members the opportunity and responsibility to nurture naturally occurring woody vegetation[19].

FMNR is a practice which involves identifying and protecting the wildlings of trees and shrubs on farmland[20]. A sustainable management of lands under cultivation and the restoration of degraded lands could be achieved by affordable strategic management innovation; taking into account the socioeconomic conditions of farmers[21]. It reduces dependency on external inputs; is easy to practice and provides multiple benefits to people, livestock, crops and the environment[22].

Studies of land degradation in MENA over the past two decades reveal overall land degradation of 40 percent to 70 percent[23]. Other studies estimate that every dollar spent on restoring degraded forests yields between 7 to 30 USD in economic benefits[24]. The term desertification is usually associated with an image of an advancing desert, with grazing and arable lands turning into deserts. Desertification is land degradation in arid, semiarid and dry areas resulting mainly from human impact[25].

Land degradation in Arab countries including Yemen is primarily caused by rapid population growth and the failure of resource management policies, coupled with overgrazing[26]. Compared to other regions in the world, many countries in MENA are

[10] https://fmnrhub.com.au/wp-content/uploads/2015/04/Francis-Weston-Birch-2015-FMNR-Study.pdf
[11] Ibid
[12] Ibid
[13] International Union for Conservation of Nature, 2019 "Facts and Figures on Forests" [Online]. Available at https://www.iucn.org/content/facts-andfigures-forests
[14] The Guardian, "Human society under urgent threat from loss of Earth's natural life" [online]. Available at https://www.iucn.org/content/facts-andfigures-forests
[15] https://fmnrhub.com.au/wp-content/uploads/2019/05/FMNR_Food_Security_Final.pdf
[16] Ibid
[17] https://fmnrhub.com.au/wp-content/uploads/2019/05/FMNR_WhatisFMNR_Final.pdf
[18] Ibid
[19] https://academicworks.cuny.edu/cgi/viewcontent.cgi?article=2002&context=gc_etds
[20]https://oar.icrisat.org/10754/1/Niger_Experiences%20in%20Regeneration%20of%20Degraded%20Lands_ICRISAT_2016_uploaded.pdf
21Ibid
[22] Ibid
[23] World Bank. 2019. Sustainable Land Management and Restoration in the Middle East and North Africa Region—Issues, Challenges, and Recommendations. Washington, DC
[24] Ibid
[25] Ibid
[26] Ibid

suffering from fragility, conflict, and violence that should be factored in when designing restoration projects[27]. Community members are in need for adequate training to enhance their capacity in managing forests and regenerations and avid further degradations, soil losses and deforestation.

It is crucial to assess the best approaches for introducing and piloting FMNR in Yemen and identify potential synergies with other projects and stakeholders. Indigenous practices of Yemeni farmer and their bonds to the tree rooted in their community history. Pruning of forest trees like Ziziphus, Acacia and Cordia occurred seasonally. The farmer used the materials coming from the pruning actions for cooking, for building as well as for fencing of crop fields like sorghum, fruit, coffee, qat and vegetables to protect them against grazing. The Yemeni farmer has experience in traditional management of his permanent crops. For centuries Yemeni farmers regenerated coffee, date palm and mango trees by using simple regeneration techniques by seed, seedlings, and cutting from the mother trees.

6.1.1 FMNR summary

FMNR is a low-cost, scalable, farmer-managed technique that counteracts fertility loss, soil erosion, biodiversity loss, food insecurity and dysfunctional hydrological cycles (flood and drought) by restoring woody vegetation on deforested and degraded land.

This integrated approach contributes to diversified food options, improved access to food and nutrition, increased crop yields and improved livestock production. Regenerating trees on cropland promotes increased crop growth during the dry season by providing shade and reducing water evaporation. Fallen leaves from many trees can also significantly improve soil fertility. Introducing FMNR along with other low-cost sustainable agriculture practices has been proven to improve food security and resilience for smallholder farmers and their families.

Research shows that FMNR has a range of direct and indirect benefits (Figure 1), including climate change adaptation and mitigation, improving food security, increasing household income, supporting improved gender equitable relations, addressing the root causes of irregular migration and supporting peacebuilding efforts by bringing communities together to agree on solutions to shared problems.

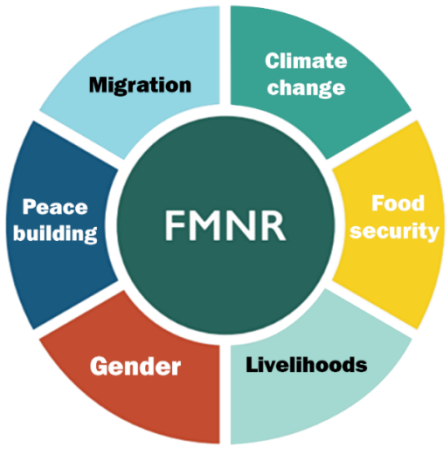


Figure 1: FMNR direct and indirect benefits

A field study by the Environment Protection Authority estimates that Yemen's forests cover about 1.5 million hectares, while rangelands cover around 22.6 million hectares[28]. Together they represent a significant resource for meeting the nutritional needs of local communities and their livestock. Some tree species improve crop growth by using their roots to lift water from deep within the soil and releasing some of that water closer to the surface in a process known as "hydraulic lift". Increased tree cover from regeneration can often result in restored water cycling in the landscape.

6.1.2 Current state of coffee cultivation in Yemen

Coffee from Yemen enjoys a niche market in global trade due to its specialty flavour and high cup value[29]. Coffee is an important cash crop in Yemen, where it is grown in 15 out of the country's 21 governorates. Coffee was introduced centuries

[27] Ibid
[28] https://www.scidev.net/global/news/yemen-s-forests-another-casualty-of-war-amid-fuel-crisis/
[29] https://www.scribd.com/document/661259765/VC-Analysis-Qat-Coffee-EN-1-August-2022

back in Yemen, and the commercial trade of coffee beans was reportedly initiated from a port in Yemen (Mocha Port) in the 1400s[30].

The agricultural statistic book of Yemen shows coffee cultivation on an area of 37,273 ha for 2021[31] with accumulated production of around 41,000 tonnes (Figure 2). Around 75 percent of the Yemeni coffee is consumed in the country and only about 25 percent is exported, mainly to Saudi Arabia and other Gulf countries, Japan, United States and Canada, Russia, France, Italy, Germany, Turkey and India [32].

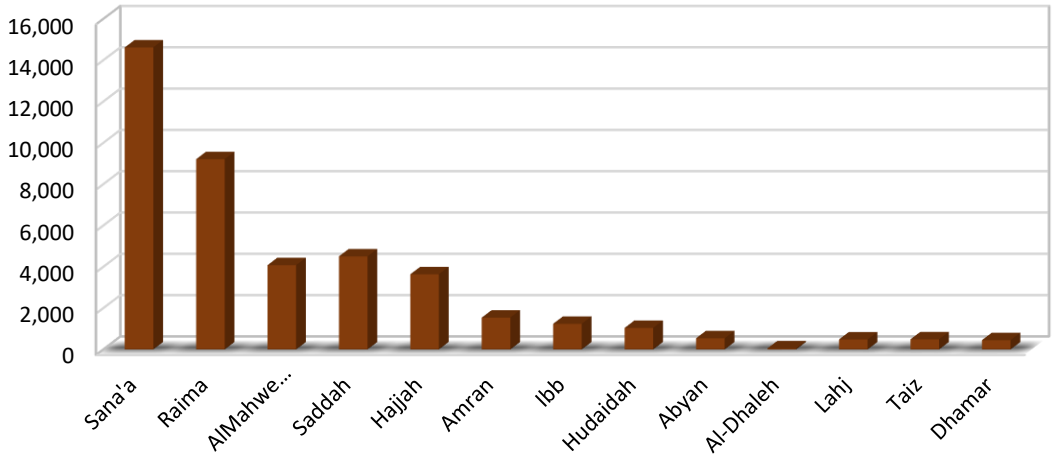


Figure 2: Coffee production in metric ton and the related production governorates in Yemen[33]

There are usually four coffee categories exported from Yemen namely, roasted, unroasted, decaffeinated, and roasted decaffeinated combined with coffee husks (*Qesher*). Thousands of Yemeni families depend on the coffee crop to develop their incomes, where nearly a million people work in this field from its cultivation to its export.[34]

Figure 2 reflects the coffee production in the most coffee production governorates of Yemen. We can see that Al-Mawit and Hajjah are among the highest ranked coffee production governorates of Yemen

Calculating the production per coffee tree for the six districts in which coffee is grown in Sa'adah governorate gives an estimate of 3,500 tons annually, from approximately 502,000 coffee trees at around 7 kg/tree[35].

6.1.3 The coffee production practices

The production practices in coffee cultivation are not labour intensive and are largely performed by family members, both male (60 per cent) and female (40 per cent). When required, paid labour is provided by male labourers (90 per cent) and by some female labourers (10 per cent). Such paid labour occurs primarily during the harvesting, processing, and marketing functions of the chain (70 per cent male; 30 per cent female).

The women's role usually involves cleaning/seedling, hoeing, picking (to some extent), drying, and packing. The positive impact of these engagements are additional family income and improved health and education indicators, while it does have some negative implications for women's caring responsibilities and routine household chores. Coffee seasonal agricultural practices[36] is illustrated in Figure 3.

[30] Ibid
[31] Yemen Agriculture Statistic, MAI, 2021
[32] https://www.scribd.com/document/661259765/VC-Analysis-Qat-Coffee-EN-1-August-2022
[33] Yemen Agriculture Statistic, MAI, 2021
[34] https://library.sweetmarias.com/wp-content/uploads/2021/05/Yemeni-Green-Coffee-Sector-Information.pdf
[35] https://library.sweetmarias.com/wp-content/uploads/2021/05/Yemeni-Green-Coffee-Sector-Information.pdf
[36] Al- Hakimi, A.A. S: Coffee cultivation and production in Yemen, 2012

	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May
First pruning season												
Second pruning season												
Mulching of soil with small stones and plant												
Harvest and drying												
Removing of dry and suspected leaves												
Organic fertilizers												
Weeding												
Complementary irrigation												
Mulching of soil with small stones and plant												
Monitoring and pest control												
Prepare the earthen irrigation canals												

Period of main activities	
Period of complementary activities	

Figure 3: Coffee seasonal agricultural practices (After Al-Hakimi 2012, modified)

6.1.4 Coffee nurseries

Coffee nurseries have been developed in 10 governorates across the coffee-growing regions to provide seedlings either in no cost, from the MAI, or with low cost with approx. 0.60 USD/seedling. Investments in private sector nurseries can facilitate plant multiplication and dissemination. Currently, there are more than 20 governmental and private coffee nurseries distributed in the coffee production regions in Yemen[37]. The biggest one is located in Ibb city, some 160 km south of Sana with produced capacity more than 600,000 coffee seedlings. The actual capacity of the nurseries is around 1,000,000 seedlings per year. Details of the locations and the capacity of coffee nurseries are reflected in the attachment.

6.1.5 Gender perspective

In the Yemeni context there is broad involvement of women in the agriculture sector, including coffee. The involvement of Yemeni women in coffee production starts with land preparation and continues through the planting of seedlings, the field agricultural practices till harvest, and the drying and packing. Moreover, women provide the majority of the total labour required for coffee production, in addition to their daily family care activities and managing their need to transport potable water and fuel from far distance (Figure 4).

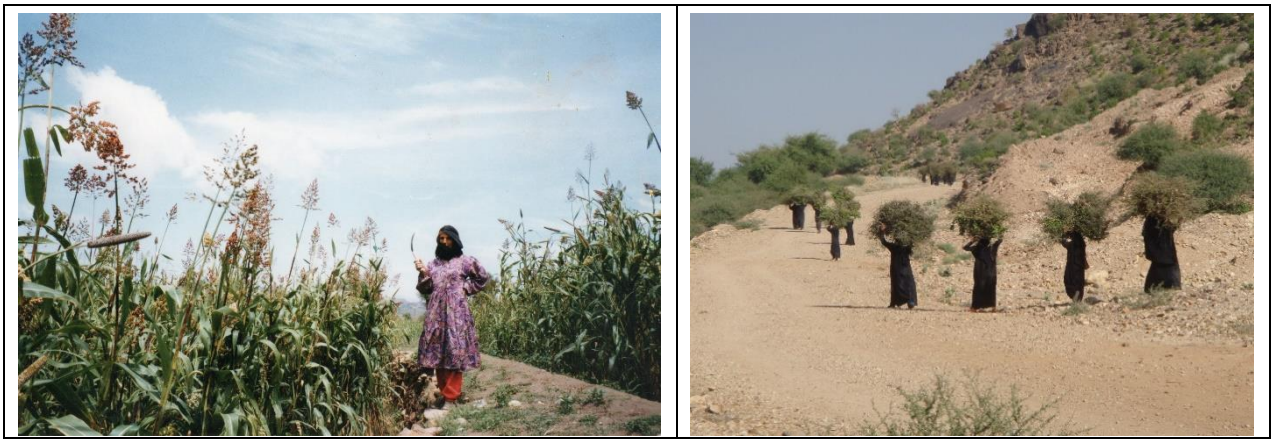


Figure 4: Yemeni women's traditional roles (Photos: Abdul Gabbar Al Kirshi)

As per Yemeni traditions and conservative socio-cultural norms, women play a significant role in maintaining coffee trees, although they lack decision-making power with regard to coffee production.[38] Figure 5 shows that women are the main actors in implementing the activities of coffee growing and harvest, but that the decisions to conduct these activities are

[37] https://www.scribd.com/document/661259765/VC-Analysis-Qat-Coffee-EN-1-August-2022

[38] Reach Initiative, "Coffee production assessment in Raymah Governate – Yemen: Preliminary findings report, Smeps, April 2014."

made by men. It is interesting to note, however, that women in Kusmah district seem to enjoy slightly more decision-making opportunities, especially regarding the use of fertilisers.

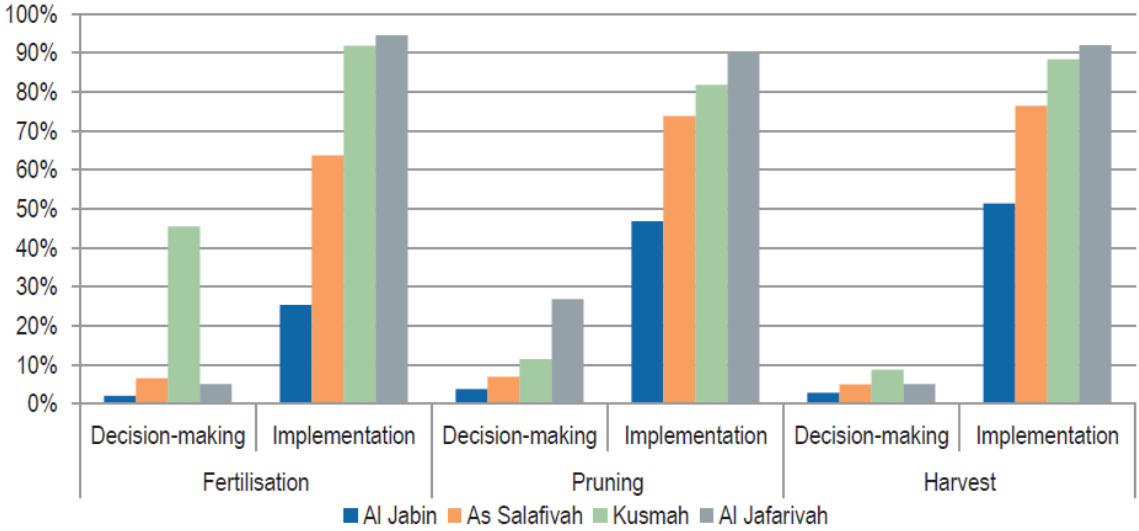


Figure 5: Women's roles by decision-making and activity implementation in three main coffee production functions[39]

6.1.6 Main challenges encounter coffee production in Yemen

There are many challenges and problems encountered in the development of the coffee sector in Yemen. Climate change, pests and diseases as well as droughts are the main challenges that need to be addressed and managed. Other weakness and threats of the coffee production in Yemen are[40]:

- The remoteness of coffee production areas and limited access to infrastructure making it difficult for the crop to efficiently reach markets.
- Competition from qat is ever growing, directly impacting the production potential of coffee and other agricultural crops. The profitability margins of qat are currently far greater than that of other crops.

6.1.6.1 Pest and disease

In the field the coffee beans are attacked by the destructive pest known as the **Coffee Berry Moth**, *Prophantis smaragdina* (Butler) which cause loses of coffee beans between 20 and 50 % yearly[41]. The most common control measures against the pest are the seasonal agricultural practices namely, seasonal soil plowing, pruning, weed cutting, removal of dry branches and dry beans and seasonal adding of compost and smoke with some natural repellents for the **Moth** like Willow Leaf Fig, *Ficus salicifolia* [42].

In the storing of coffee beans there also several storage pests that could attack the dried coffee beans due to poor storage conditions. These include the red flour beetle, *Tribolium castaneum* Herbst, the confused flour beetle, *Tribolium confusum* Duva, the sawtoothed grain beetle, *Oryzaephilus surinamensis* (L.), the lesser grain borer *Rhizopertha dominica* (F.) and the pulse beetle, *Callosobruchus chinensis* L[43]

6.1.6.2 Coffee and climate change

Potential climate change impacts on Yemen and its agriculture have been analyzed as significant and are expected to become detrimental in the near future. Yemen's temperatures are rising more rapidly than the global average[44].

Drought, desertification, and erratic rainfall patterns are not favorable for a society where approximately 60 % of the population depends on incomes generated from natural resources. Higher than historical temperatures have been witnessed

[39] Ibid.
[40] https://www.scribd.com/document/661259765/VC-Analysis-Qat-Coffee-EN-1-August-2022
[41] Saeed Sharagaby, unpublished paper.
[42] Ibid
[43] حصر الحشرات المتلازمة مع البن تحت ظروف التخزين التقليدية في اليمن، غير منشور، الورشة الوطنية عن الوضع الراهن لإنتاج البن في اليمن وآفاقه المستقبلية، كلية الزراعة– جامعة صنعاء-صنعاء، 10-2004/8/13م
[44] Template (climatelinks.org)

in the last 5- 10 Years. As seen in Figure 6, the country has on average experienced an average warming of 0.5°C during 20th century across the country[45].

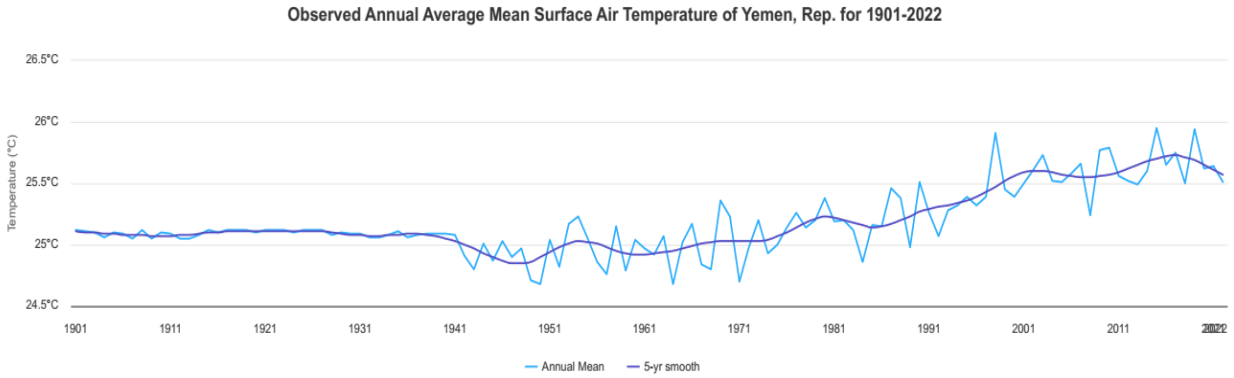


Figure 6: Average Annual Temperature Range in Yemen from 1901-2022

Climate change is expected to increase temperatures, variability of rainfall and heavy precipitation events in Yemen. Greater rainfall variability could increase drought periods and diminish water supplies more rapidly. Rising temperatures and changes in rainfall patterns will affect agricultural yields, of both rainfed and irrigated crops.[46].

Parallel to the temperature fluctuation there is also fluctuation in rainfall. The households mentioned during the survey that in the past 10 years there has been heavy drought in many years and heavy rains in some years. Figure 7 reflects the average monthly rain in Yemen under three alternative climate change scenarios: a baseline that assumes a continuation of current mitigation trends, and two scenarios used in the Intergovernmental Panel on Climate Change's Fourth Assessment Report (MIR and CSI).

Using these differing scenarios for precipitation, estimates in changes in agricultural yields were calculated for different agricultural zones in Yemen.[47] Under the MIR scenario, agricultural GDP is somewhat higher compared to the CSI scenario in the region containing the Taiz Governorate and rural incomes rise due to higher yields and lower prices for sorghum and millet. Under the CSI scenario, positive and negative yield changes cancel each other out.[48]

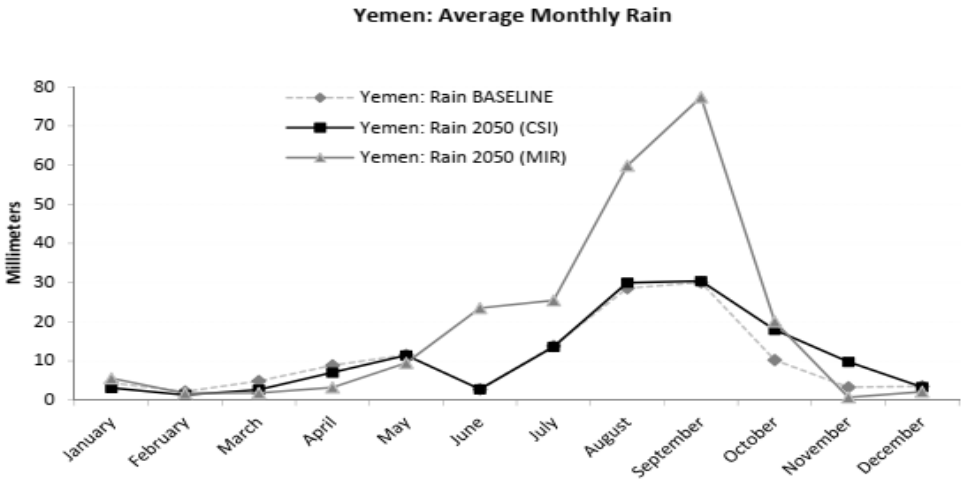


Figure 7: Average monthly rain in Yemen

[45] https://climateknowledgeportal.worldbank.org/country/yemen-rep/climate-data-historical

[46] https://www.ifw-kiel.de/fileadmin/Dateiverwaltung/IfW-Publications/Manfred_Wiebelt/climate-change-agricultural-production-and-food-security-evidence-from-yemen/KAP_1747.pdf

[47]https://www.researchgate.net/publication/254426901_Climate_Change_Agricultural_Production_and_Food_Security_Evidence_from_Yemen

[48]Ibid

6.2 Finding in the fields

6.2.1 Finding during the workshops, the FGDs and KIIs

6.2.1.1 In Al-Mahwit

Coffee is grown in 9 Directorates s in the governorate namely, Al-Khabt, Al- Rujm, Al-Taweelah, Jabal Al-Mahwit, Bani Saad, Hafash, Shibam and Milhan. The District of Al- Rujm is considered the best in terms of productivity, while the coffee grown in the Hafash district (known as Hafashi coffee) is considered the best in terms of quality, while the Milhan district is the largest in terms of the area planted with coffee.

Figure 8 reflects the most important coffee growing sites in Al Mahwit governorate. Jabal Al- Mahwit and Malhan have been mentioned as most known coffee growing sites in Al-Mahwit.

The most widespread varieties in Al-Mahwit are Al Bayad, Al Bara'ai and Al Udini. Al Bayad variety is considered the best for producing dry coffee beans (a kilogram of green yields approximately half a kilogram of end coffee beans) because the seed inside the fruit is larger compared to the rest of the varieties. Other varieties one kilogram produces a one third of a kilogram of coffee beans.

According to the discussions, the size of the farm holding in Al-Mahwit ranges from 15 to more than 1000 Libna[49]. According to the agricultural census[50] Malhan district ranks first in terms of coffee area with a percentage of (36.4%), followed by the Bani Saad district with a percentage 29.7%, then Haffash district, with approximately 16% of the total coffee area in Al-Mahwit Governorate.

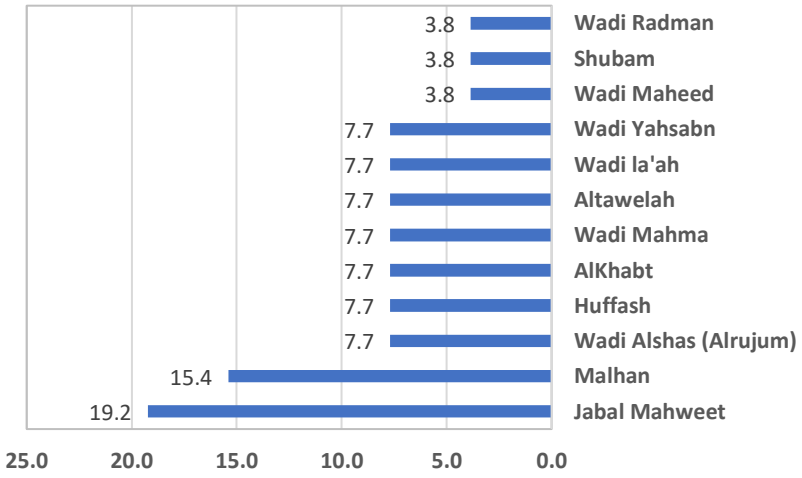


Figure 8: Most important coffee growing sites in Al Mahwit governorate (n= 22)

6.2.1.2 In Hajjah

Figure 9 reflects the coffee growing districts in Hajjah based on data in the published notebook "strategy for development of the coffee sector, by MAI in Sana'a, 2020" as well as data collected during the field work. Ku'adinah, Bani Alawam, Sharas, Mabyan, Al MaGharbah and Qarah are the coffee production districts (See map in the attachments), while Bani Ala'awam, the rural city of hajjah, wadi Sharas and Mabyan are the most important coffee growing sites mentioned by the workshop participants in Hajjah.

[49] Libna: 8 m * 8 m = 64 m^2.
[50] Yemen, agricultural census, 2002

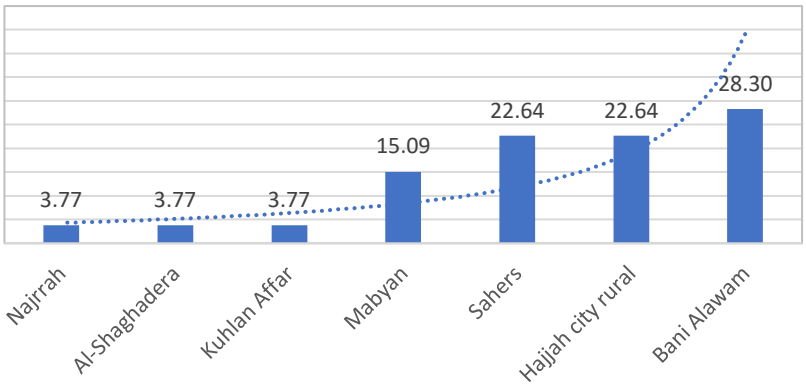


Figure 9: Most important coffee growing districts in Hajjah (participants answer n= 25)

6.2.1.3 In Lahj

The Lahj coffee sites are concentrated mainly in Yaher, Alhad, Almuflehy and Labu'us (See map in the attachment). Although the coffee production in Lahj occupied a place far away compare to Al-Mahwit and Hajjah (Figure 2), but increasing in the last years rapidly

6.2.2 FMNR and the current project

Some actions of FMNR have been practiced since ancient times in Yemen and in the targeted governorates as well, where farmers used to prune tree branches, or cut the tree leaving the stem unharmed in order to maintain continuous growth. With this wise practice, they were able to conserve abundant of wood for the production of cooking fuel and construction, as well as the production of food and fodder without the need for frequent and costly replanting trees. In general, the benefits of FMNR bring many economic social and environmental benefits, the most important of which are as follows:

- Increase food and timber production.
- Ability to adapt to harsh climatic conditions.
- Restore the productivity of degraded agricultural lands and pastures.
- Restore degraded forests, thus preserving biodiversity.
- Preserve landscapes that have not yet been degraded.
- Producing fuel, building materials and feed for livestock animals.
- Preserving natural resources in agricultural lands.
- Providing optimal growing conditions for crops (by making a favorable microclimate with better soil moisture and less intensive sunlight also improving soil fertility and reducing wind damage and soil erosion)

6.2.2.1 Reasons behind disappearance of some trees

The question, "What are the reasons for the disappearance of trees in your area?" was directed to all participants in the workshops.

It was found that the expansion in Qat cultivation ranked first by 25.81% I Al-Mahwit, while the lack of experience came second by 11.29%. Lack of selecting good varieties and the inability of reproducing good varieties that are found, logging and overgrazing came third with 8.06% for each. These are followed by problems of outbreak of pests and diseases, lack of awareness of the importance of trees, internal migration and dry weather with a percentage of 6.45% for each out of the total answers.

Figure 10 shows in details the reasons of decline of some coffee trees as well as forest trees. The related figures for decline or disappearance of trees in Hajjah as mentioned by the Workshop are reflected in Figure 11. Overgrazing, droughts and excessive logging as well as the expansion of qat cultivation areas are the most reasons for negative impacts on trees regenerations.

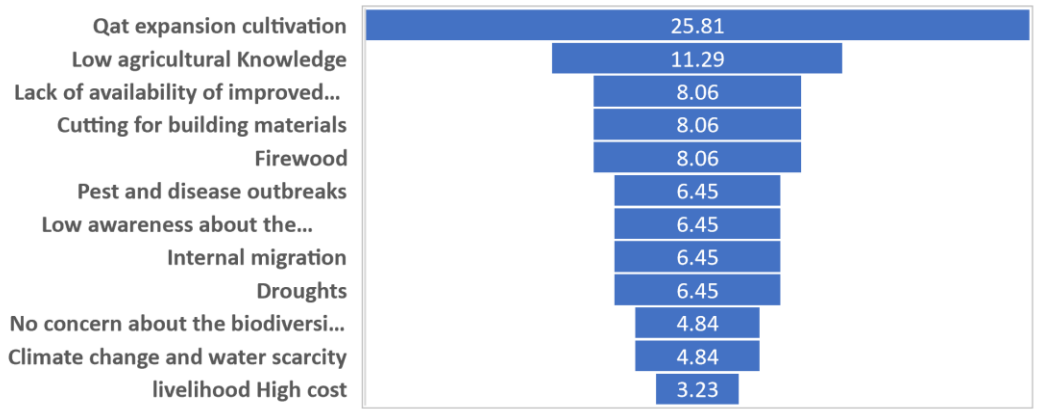


Figure 10: Reasons for decline or disappearance of trees in Al-Mahweet as mentioned by the Workshop participants (n= 22)

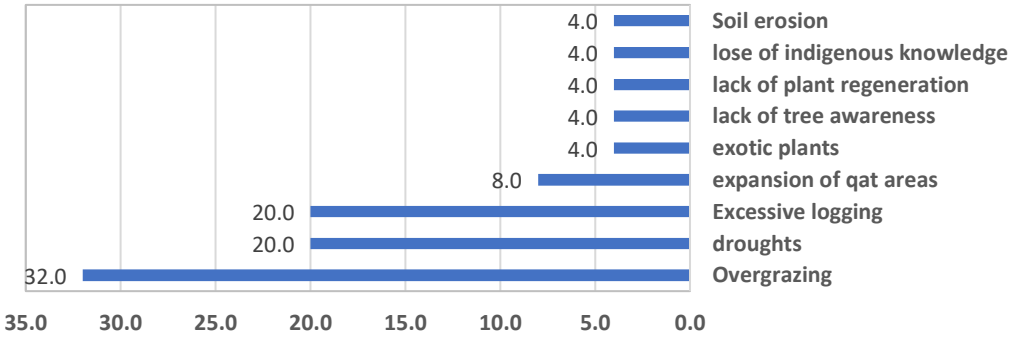


Figure 11: Reasons for decline or disappearance of trees in Hajjah as mentioned by the Workshop participants (n= 30)

6.2.2.2 FMNR and possible reduction of logging

Logging and intensive cutting of trees has occurred increasingly over the last 10 Years throughout the country. The respondents have mentioned the following reasons for tree cutting and firewood-gathering include:

- Logging for sale or personal use
- Logging for charcoal production
- Logging for sale to merchants and bakeries.
- Logging for use as timber for construction

When asking participants about what are the most important trees and shrubs that have been negatively affected by logging it turns out that most forest trees are subject to felling and logging. Figure 12 shows that Taleh (acacia sp) trees rank first in terms of excessive logging, at a rate of 27.8%, followed by Ziziphus trees at about 20.4%, then Cordia and qardh at a rate of 11.1% each, out of the total responses of the participants.

Acacia and Ziziphus trees are considered important sources of food for honeybees, and Cordia trees are friendly to coffee trees. It is noted that other trees are subject to use as firewood, such as Mesquite, Dhaba, Salam, and other forest trees.

The related figures mentioned by the participants of the workshop in Hajjah are illustrated in Figure 13. The Sidr and the Tanb are the most trees affected by logging followed by the different acacia species like Salam, Tharah, Sumor and Dhubbah.

6.2.2.3 Overgrazing

Overgrazing results in the depletion of an important part of the vegetation cover which makes the soil surface vulnerable to atmospheric factors. This leads to an increase in the speed of decomposition of organic matter in the soil, and thus the soil loses the upper most fertile layer. This may lead to the destruction of the soil structure, and the formation of a thin, solid crust of calcium carbonate on its surface preventing rainwater from leaking into the lower soil sectors. During drought seasons, leafy trees such as Cordia, Ziziphus, Salam and Samr are cut down to feed livestock animals.

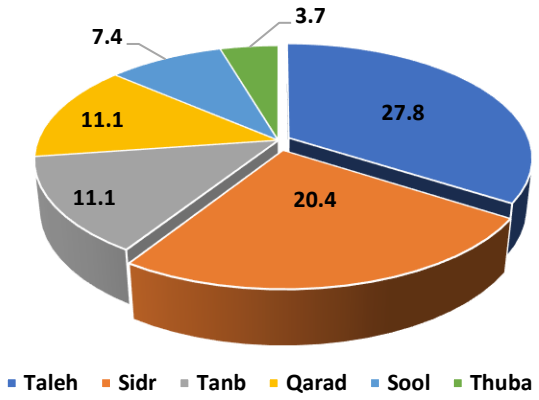


Figure 12: The most important trees and shrubs that were negatively affected by logging and overgrazing as mentioned by Workshop participants in Al-Mahwit (n= 22)

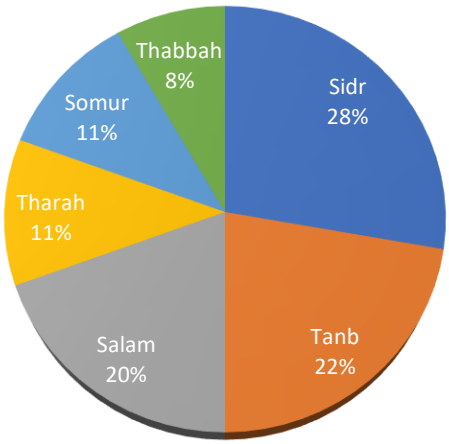


Figure 13: The most important trees and shrubs that were negatively affected by logging and overgrazing as mentioned by Workshop participants in Hajjah (n= 25)

6.2.3 FMNR and trees and shrubs associated with coffee cultivation

It was considered important to know which trees and shrubs are associated as positive and have synergy with coffee cultivation. Tanb, Itheb, Taluq and Tharah are the widest ranging trees of positive effect for coffee cultivation in Hajjah as mentioned by the workshop participants (Figure 14), while Tanb, Papaya, Mango, Guava and Tamarind have been mentioned by the participants in the workshop in Al-Mahwit and Taneb, Papaya and Guava have been mentioned in Lahj (Figure 15).

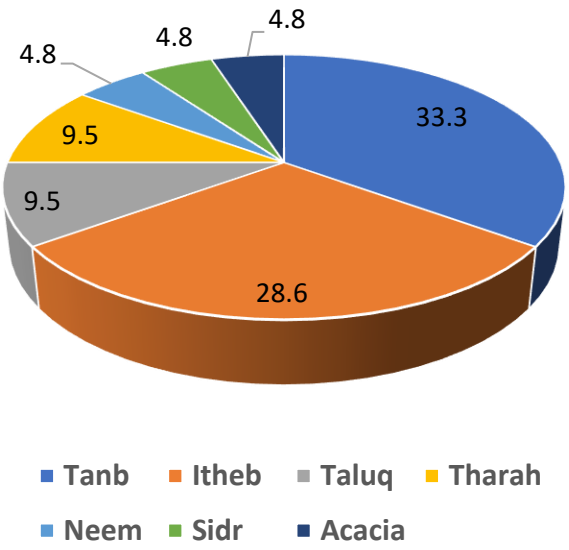


Figure 14: The trees and shrubs associated as positive and synergy with coffee cultivation. (mentioned in Hajjaha, n = 25)

Trees and shrubs associated with coffee in Al-Mahwit

Tanb, Papaya, Mango, Guava, Tamarind are the most synergetic plants associated with coffee cultivation as mentioned in Al-Mahwit. Figure 15 shows the most important trees and shrubs that benefit coffee trees in terms of providing shade and other good environmental factors. It is important to create a program and for nurseries to propagate and breed these trees in addition to coffee trees.

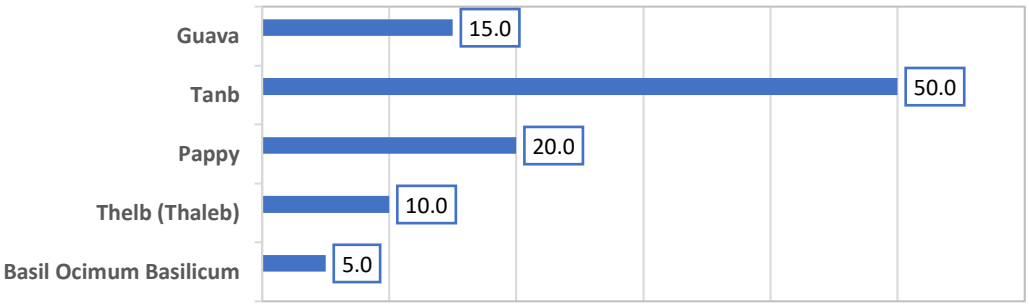


Figure 15: Trees and shrubs as synergy with coffee cultivation. (mentioned in Lahj, n = 25)

6.2.4 The FMNR activities of the current project

6.2.4.1 Agroforestry and its link to coffee cultivation

Agroforestry is a collective name for land use systems that combine trees with crops and/or animals on the same unit of land and therefore, agroforestry creates farm micro-climate (humidity, sun intensity and wind) thereby helping farmers to get high farm yields[51]. In Yemen like elsewhere, coffee farms need agroforestry systems to conserve soil nutrients; protect and improve coffee yields; and avoid water and soil losses.

Agroforestry systems (AFS) are being promoted as a more appropriate land use system than monocropping systems (MCS) worldwide[52]. Study evaluated the soil nutrients, organic matter (OM), and other soil properties such as pH, bulk density, and porosity under AFS and compares it with soil under MCS in Rima'a Valley showed that agroforestry practices of mixed trees with coffee and *Cordia africana* L. have a synergetic effect with higher nitrogen concentration in the soil[53].

[51] https://www.camgew.org/pdfs/Report%20on%20Agroforestry%20Training%20for%20Coffee%20Farmers.pdf

[52] https://doi.org/10.1080/10549811.2012.654723

[53] Ibid

The use of agroforestry trees in and around coffee farms enables coffee crops to benefit from shade and soil conservation. Coffee farmers can plant various appropriate tree fences of benefit to them and this will improve the lives of farmers. Farms with no shade or mulching leaves farms dry. Agroforestry systems come to integrate trees, crops, people, and/or animals on the same piece of land to increase productivity, obtain greater economic returns, and more social benefits on a sustained basis This can be done by planting appropriate trees and crops together with coffee in the same field.

Ultimately, the use of agroforestry leads to food security, soil and water conservation, and long-term sustainable agriculture. A coffee farmer needs to develop his/her farm in such a way that each month he/she should have something to harvest from the farm while waiting to harvest coffee later.

6.2.4.2 Where to conduct FMNR during the project

It is difficult to fix here that FMNR activities should be conducted in the coffee fields or in other places with the same community. Some coffee farmers are already practicing kinds of FMNR activities in their fields (We observed this in Yaher, Yafe'e Lahj Governorate). Other farmers in other locations may have restraints against practicing FMNR activities like excessive pruning in their fields and prefer to practice the activities with other agroforestry plants. Both options are possible either in monoculture crops or along with coffee synergies plants mentioned below.

The following plant *and shrubs are mentioned by farmers to be associated as giving synergy with coffee farms:*

Scientific name	**English**	**Local name**
Ziziphus spina-christi	Christ's Thorn	Al-Sedr
Cordia Africana	Sudan teak	Al-Taneb
Annona squamosa	Custard Apple	Al-Kehermish
Ceratonia siliqua L	Carob	Al-Kherweb
Dodonaea viscos	Hop Bush	Al-Shahs
Pandanus ordoratissimus	Screw -Pine	Alkathy

The most important operations and **the agricultural practices** have been summarized by the workshop participants in Al-Mahwit as follows[54]:

- Preparation of the land for planting of new seedlings from March to May.
- Preparing seedlings village and in public nurseries.
- Pest control if any infestation observed.
- Pruning, during November and December and when needed.
- Weeding during the whole year.
- Irrigation by water harvesting in rain seasons and use of supplementary irrigation when needed.
- Coffee berry growth from June to August.
- Coffee berry harvesting during September and October.
- Post-harvest treatments during November and December.
- Marketing during all months of next year.

When participants were questioned about the current techniques used for growing coffee, they reported that the prevailing methods are traditional methods and based on their individual effort and technical and financial capabilities. About 62% of coffee cultivation depends on rain-fed irrigation while 38% rely on supplementary irrigation from underground wells and water streams.

Coffee trees are currently propagated through sexual propagation by planting seeds in nurseries and then transporting them to the farm and planting them in rows with distance ranges from 2 m by 2 m. The distance between one tree and another in the same row ranges from 2 to 3 m in the case of monoculture. The dimensions increase in the case of intercropping.

In terms of the participants' recommendations regarding techniques required to develop the regeneration of coffee trees, the recommendations of the participants have been illustrated in Figure 16.

[54] Compare Al- Hakimi, A.A. S: Coffee cultivation and production in Yemen, 2012

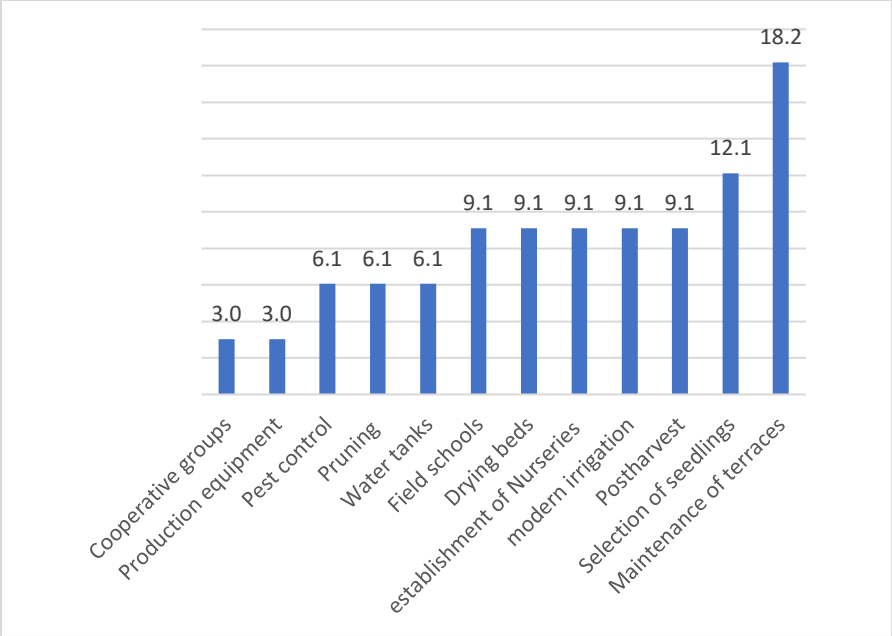


Figure 16: Respondents proposals regarding the techniques required for regeneration of coffee trees (Al-Mahwit)

It is clear from Figure 16 that maintaining terraces and protecting the banks' valleys are considered among the priorities of farmers' needs in the targeted areas. The next priority is the technology of providing and inspecting good seeds, then post-harvest techniques, including providing beds and tools for drying coffee beans in order to preserve the properties and quality of coffee beans.

Looking at the Figure 17, showing the recommendation of Hajjah workshop participants we can again see that the water issue, although mentioned as second priority, as a main coffee production factor should be put in the first line of recommended activities of the planned project. Establishment of new water harvesting tanks as well as maintenance of traditional rainwater harvesting methods like cistern, ponds and villages small dams will contribute to manage the water availability for irrigation and for domestic use. Other agricultural practices like pruning, postharvest equipment capacity building and farmer training are essential activities for enhanced production and improving the quality of coffee cultivation in Yemen.

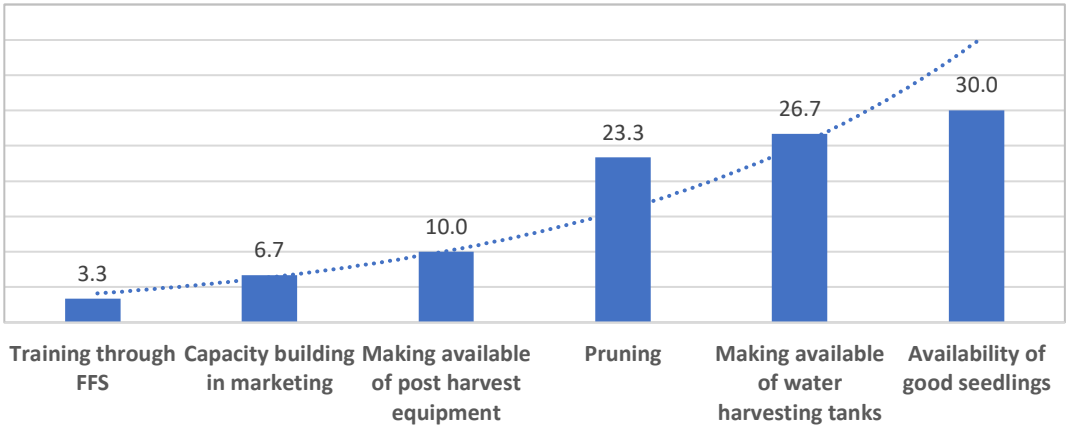


Figure 17: Requirements for coffee regenerations as mentioned in Hajjah workshop (n = 30)

6.2.5 Obstacles associated with coffee cultivation in Yemen

Table 3 includes the most important obstacles facing coffee cultivation as mentioned by the workshop participants in Al-Mahwit. It is clear from the table that the five most important obstacles preventing the expansion of coffee cultivation are:

1. The expansion of the cultivation of Qat trees at the expense of coffee trees cultivation.
2. The exposure of coffee trees to diseases and pests.
3. Low prices of coffee compared to the price of Khat.
4. Weak capabilities and skills of farmers to market coffee fruits using modern methods.
5. Lack of sufficient water for irrigation as well as the lack of tanks for harvesting rainwater.

Table 3: The most important current obstacles facing coffee cultivation

Obstacles	**Frequency**	**%**
Expansion in Qat cultivation	13	16.25
Pest and disease infestations	12	15.00
Low price of coffee	10	12.50
Inability of farmers to distribute their product	8	10.00
Shortage in water availability	5	6.25
Lack of irrigation system and water harvest tanks	4	5.00
Harvest of fruits before the fully ripe	4	5.00
Lack of machines and tolls for drying fruits	4	5.00
Lack of guidance and consulting	3	3.75
Drought and desertification	3	3.75
Lack of abilities to expand in coffee cultivation	2	2.50
Low productivity	2	2.50
Import of coffee which compete with local production	2	2.50
Fluctuations in rainfall patterns	2	2.50
Lack of equipment for postharvest operations	2	2.50
Communities' week awareness of modern method for coffee agriculture	2	2.50
Lack of organizations and associations	1	1.25
Climate change	1	1.25
Total answers	80	100
Source: Results' summary for workshops and field interviews		

The workshop participants in Lahj have confirmed similar main obstacles as mentioned in Al-Mahwit and focused more on poor awareness of the procedures of marketing, the limitation of water harvesting sources and poor equipment of post-harvest techniques (see Figure 18).

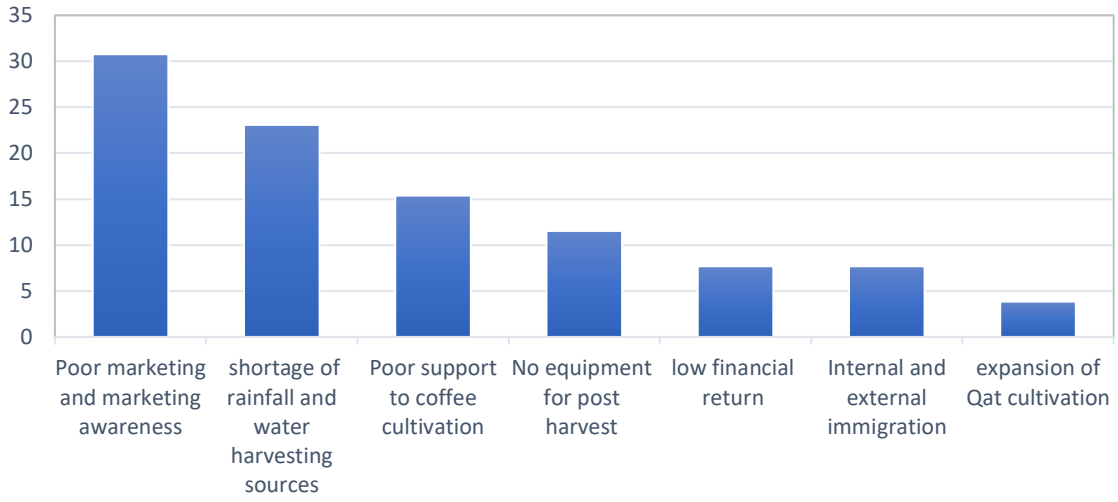


Figure 18: The most obstacles facing coffee cultivation in Lahj

6.2.5.1 Climate change

When the respondents were asked about the climate changes that occurred and affected the coffee production areas, the answers were as shown in Figure 19 for Al-Mahwit and Figure 20 for Lahj. It is noted from the answers in Al Mahwit that the irregularity in rainfall (heavy in some seasons and drought in other seasons) was reported by 24.14% of the participants in workshop, while the delay in rain season came in second place with a rate of 20.7% in-depth discussion groups.

It is noted that one of the results of climate change is the weakness and delay of pollination among coffee trees. This was noted by about 7% of those discussed in the coordination workshop and discussion groups, as compared to what was the case before 10 years. Looking at figure 18 and the related associated figures (Figure 19 and Figure 20) we can observe that temperature changes, droughts and destratifications, fluctuation of rainfall and flood and heavy Sails (water stream) are the most features associated with climate changes.

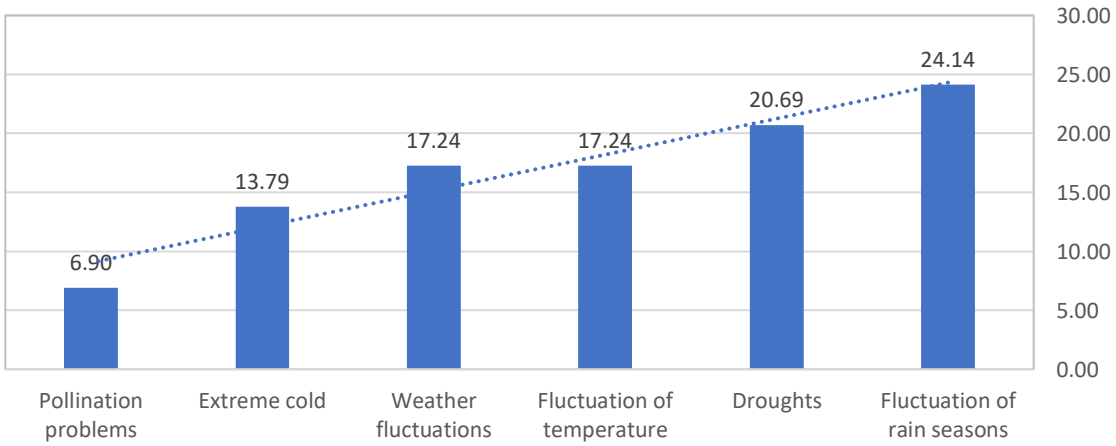


Figure 19: The answer of the respondents of FGD in Al Mahwit regarding the effect of climate change in the last 5- 10 years

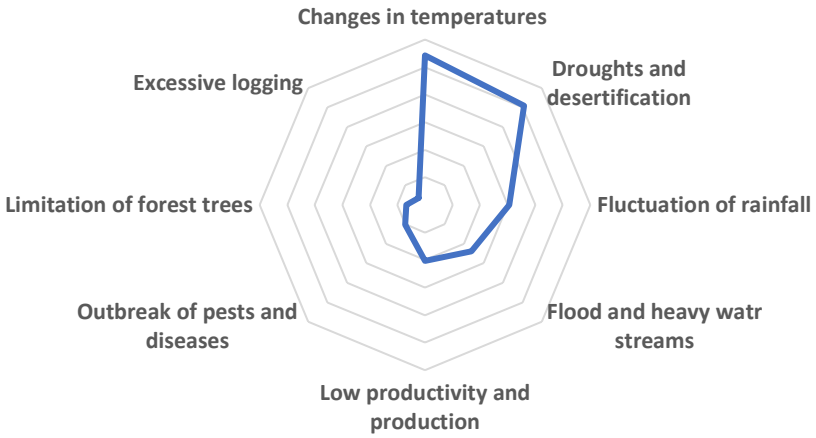


Figure 20: The most features associated with climate changes in Lahj as mentioned by the workshop participants (n= 30)

In addition to climate change, Figure 21 reflects additional obstacles encountered in coffee cultivation as mentioned by the participants in Hajjah workshop. Drought and water scarcity as well as the poor post-harvest practices were included. Picking of coffee cherries takes a long time (weeks or couple of months) and mixing early with late picked cherries with different water content makes the cherries subject for mold and infection by fungus. Accordingly, the participants in Hajjah have mentioned that pest and disease in the field and by post-harvest in the store as third main obstacles of coffee cultivation in Hajjah.

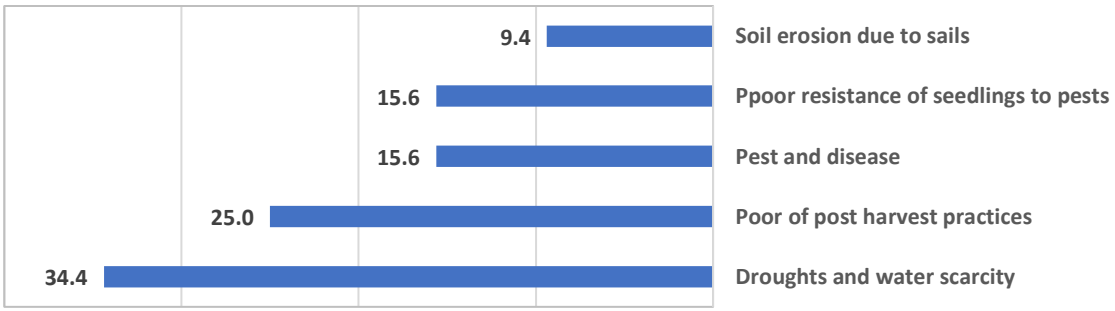


Figure 21: Main obstacles of coffee cultivation as mentioned in Hajjah workshop

6.2.6 Structure of markets and value chains

The coffee market is known as the real or virtual place in which the processes of demand and supply are applied. It provides interaction between sellers and buyers in order to provide services and sell coffee beans in exchange for barter or money.

Figure 22 shows that 40% of the farmers sell coffee to merchants who own private companies from outside the governorate. Another 40% of the coffee farmers display their production of coffee beans in the local central markets of the governorate, while about 8.6% of the coffee farmers transport the coffee beans to the central markets in the capital city of Sana'a. The farmer's share is estimated at about 56.3% of the consumer price, while 43.8% of the consumer price goes to the owners of the marketing companies.

There is an inverse relationship between the selling prices of Qat and the expansion of coffee cultivation. One farmer said that during the period from January 1, 2021 until January 1, 2022, there was a decline in the prices of Qat in Al-Mahwit, and as a result, people tended to remove Qat trees and replace them with coffee trees.

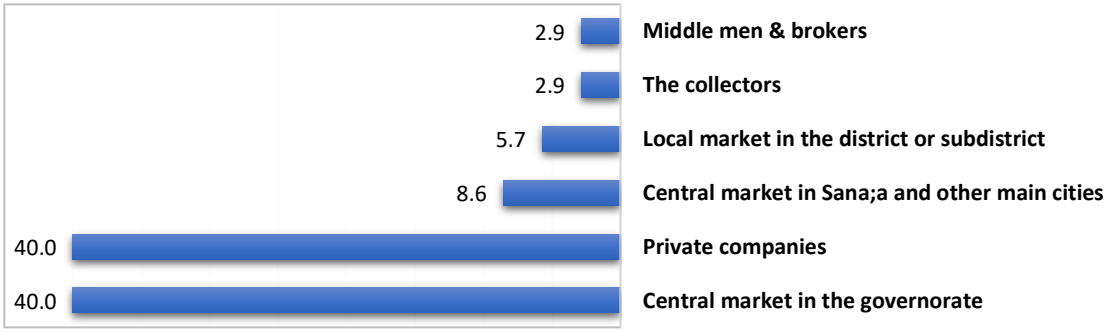


Figure 22: Marketing of coffee beans according to the percent answers of the respondents

6.2.6.1 Production, productivity and land holdings

The average production of a coffee tree ranges between 5 to 20 kilograms[55], and this varies according to its age. The productive age of the coffee tree in Al Mahwit ranges from age of one and a half years to forty years, and the best production age is between 10 to 20 years.

6.2.6.2 The main actors in coffee value chain

There are many marketing companies the three targeted governorates and in the other governorates of Yemen including Sana'a and Aden. The company's representative makes visits to the coffee production area from the beginning of the harvest until the completion of the sale process. There is prior coordination between companies so that each company covers certain areas.

The companies buy from the farmers the first round, in which the beans are ripe and of high specifications at price of 4,500 YR/kg in north and approximately 12,000 YR/kg in south. If the farmer decides to sell the product of the first pound in the local market, the price will be lower (e.g. 4,000 YR in north), less than selling through the companies by about 500 YR.

The second round of coffee harvest is sold in the companies at a lower price, or sold by local markets at a lower price, or allocated for personal use. All farmers who were targeted for discussion agreed that there were shortcomings and weaknesses regarding the post-harvest operations of coffee, and expressed their need for coffee drying tools and awareness programs at this stage.

Figure 23 reflects Intra- and interspecific action of the different coffee value chain actors. The red circle reflects the current most actors making the most profit of the coffee production.

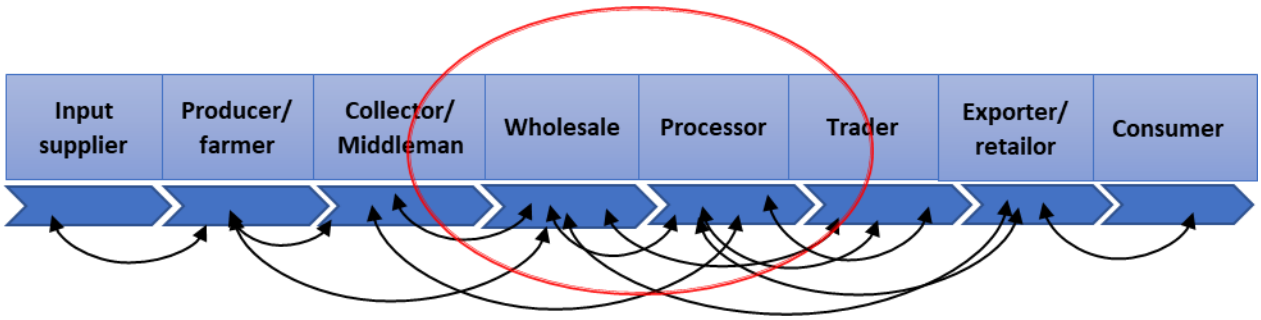


Figure 23: Intra- and interspecific action of the different coffee VC actors[56]

6.2.6.3 Assessment of main partner

It was necessary that the consultant met the technical representatives from the NFDHR and check their technical capacities for fulfilling the objectives of the project. A joint meeting has been conducted with the leadership of the NFDHR in their main office in Sana'a. The consultants have met the following NFDHR actors:

[55] It is somehow exaggerated by the participants, up to 7 kg/ tree is expected.

[56] Compare: https://www.scribd.com/document/661259765/VC-Analysis-Qat-Coffee-EN-1-August-2022

Staff	Position
Mohamed Abdulla	Executive director
Adel Husain	Deputy Executive director
Khaled Al-Othmany	Deputy Executive director for programs
Najwa Abdul Rahman	Program department
Dr. Maher Mua'at	Dep. Director for quality issues
Dr. Abdul Rahman Salah	Agricultural expert

NFDH has implemented agricultural projects in the last five year together with YHF/ OCHA, IFAD/ FAO, CERF/ FAO, Direct AidYemen, BMZ/ VHI in Hajjah, Al- Dhalee, Taiz, Abyan, Al Hudaydah, Hajjah, Sa'dah and Al Mahwit, respectively. Table 4 reflects the technical staff available for agriculture activities.

Table 4: Key experts and staff associated with agriculture of NFDHR

Position/ title	Qty	Qualification	Main responsibilities
Deputy of executive director - Quality	1	PhD. Agriculture	Ensuring the quality of the overall FSL and MEAL for FSL
MEAL advisor	1	PhD. Resources and water management	MEAL for FSL projects and M&E
MEAL officer	1	BSc. Agriculture	Appointed in different locations for agricultural activities supervising
Irrigation, WASH and water engineers	15	BSc	Appointed in different locations for Irrigation, WASH and water activities supervising
FSL program manager	1	Engineer	Appointed for FSL technical and structural projects
FSL program officer	1	Social development	Appointed for FSL technical and social issues
FSL branch manager/FSL district assistant/agriculture engineer/ field coordinator	5	BSc agriculture	Positions for FSL and agricultural activities

Accordingly, we recommend continued partnership with NFDHR in this project taking into account that the NFDHR should make short contracts with certain experts of horticulture in the three targeted governorates.

6.2.6.4 Other potential partners

During the workshop, the participants were asked to identify the names of local actors who could support and ensure the success of the project activity. The proposals and answers were summarized in Figure 24. From the figure we can observe the first main actors that can help by implementing the project activities namely, the agricultural offices at governorate level, the coffee farmers, the local authorities as well as the research institutions and the universities.

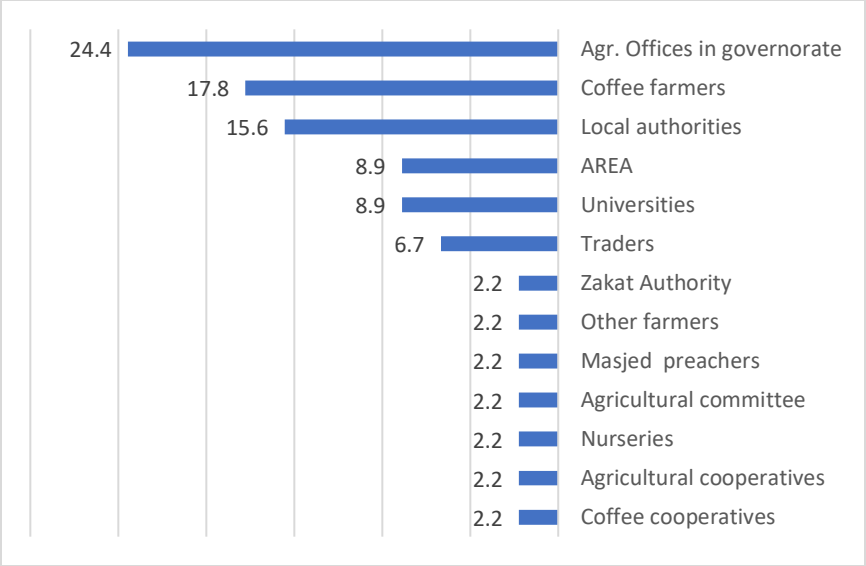


Figure 24: Respondent answers in percent regarding the possible partners for success of implementation the project activities

6.3 Evaluation of the project against the Guide to conducting feasibility studies of the BMZ

6.3.1 Relevance

Will the planned project approach address a key development problem or a significant developmental bottleneck in Yemen?

- The project is relevant to Yemeni strategies (Agriculture, water, poverty).
- The project is relevant to the new strategy of development of coffee production 2020-2025.
- Relevance to international initiatives (UNDP initiatives from Qat to coffee, 2022).

6.3.2 Impact

Main objectives of the project are capacity building, awareness and training of the targeted beneficiaries including women and youths of coffee farmers and local authorities in the agriculture sector in the targeted governorates. This would focus on FMNR techniques and improving the institutional structures of cooperatives. This leads to positive impact on the planed results of the project.

6.3.3 Effectiveness

Main questions:

- Are the cause-effect relationships (including assumptions) plausible? What negative effects might arise?
- How will changes be measured? What indicators (fields) are most suitable?

The cause- effect relationship of the project activities such as capacity building and training are plausible. However, we should be flexible by conducting some activities of the FMNR like pruning, terrace rehabilitation and maintenance of irrigation canals etc. to avoid negative effects on the farm fields or on the environment and biodiversity. Baseline surveys at the early stage of the project implementation is necessary with clear agricultural practices indicators, and assessment of transport and marketing. Mid- and endline evaluation are then necessary also for measuring the changes.

6.3.4 Efficiency

- To what extent can the planned measures be implemented with the envisaged funds and personnel in the proposed time period?
- To what extent can the envisaged spending be allocated cost-effectively, and are the investments, operating expenses and personnel in proportion to the intended goals?

FMNR activities are low-cost interventions with high returns. The allocated fund is efficient to the planned activities. However, fluctuations in exchange rate of the Yemeni currency should be taken into consideration. Moreover, the different exchange rate of the Yemeni Rial (YR) between south and north can make some confusions in terms of investments, operating expenses and personnel payments.

6.3.5 Sustainability

- What long-term capacities will be established in the beneficiaries to enable them to continue the implemented measures independently?
- What positive changes (role behavior, mechanisms, networks, etc.) will be of long-term benefit to civil society?
- What personal risks for those implementing the project, or institutional or contextual risks, may influence the sustainability of the project? How can these be minimized?

Personal sustainability: Capacity building and training of farmers in FFS as well as distribution of visual awareness materials and visual training manuals are the main instruments of sustainability. In addition, the training of selected local authorities personal in dealing with cooperatives, producing groups of coffee ensure the sustainability after project completion.

Cooperative sustainability: Forming or/and empowerment of existing associations and groups (coffee producing – marketing cooperatives/groups, WUAs, WUGs). These increase the local ownership and lead to sustainable continued activities.

6.4 Qat issue

The exclusion of qat from the national development and research activities has lost Yemen decades of precious time[57.]. Reducing qat consumption in Yemen remains a daunting task, as the regulatory environment as well as the popular perception of qat is difficult to change[58]. The qat cultivation affects negatively the water resources in the country which is already very limited. Together with coffee promotion activities, awareness activities should be developed to reduce the overuse of water for qat cultivation as well as the excessive use of pesticides and other chemicals[59]. Decreasing the overall water consumption used in Qat would result in water savings that can be allocated to growing other high-value crops, such as coffee, or for meeting the growing demand of water in other sectors. To this end, the following recommendation have been raised by UNDP Qat and coffee value chain analysis in 2022[60]:

- Study the feasibility of installing water meters on diesel and solar pumps.
- Assess the effect of higher tariffs and taxes on diesel and solar pumps used for qat irrigation.
- Consider establishing groundwater use quotas for qat irrigation.
- Promote the use of green water (i.e., rainfall) for qat production where possible and assess how to reduce the use of blue water (i.e., irrigation water) in qat production.
- Promote the willingness of farmers to switch cultivation from qat to coffee with potential compensation.
- Promote modern water-saving technology to regulate the overuse of water used for qat irrigation.
- Gradually move towards full water pricing for qat cultivation.

[57] https://www.scribd.com/document/661259765/VC-Analysis-Qat-Coffee-EN-1-August-2022

[58] Ibid

[59] Ibid

[60] Ibid

7 Conclusion

7.1 General problems and difficulties related to trees disappearance

- The firewood trade has become a common profession due to current fuel prices, rural poverty and the lack of job opportunities.
- The excessive logging phenomenon has grown during conflicts leaving negative impacts that threaten the environment and increase desertification.
- People cut down trees by their roots in randomized manner.
- Weak control over the phenomenon of logging, as well as weak awareness of the environmental disaster arising from the growing logging in the targeted areas.
- In addition to coffee production, livestock and beekeeping are affected by excessive logging, leading to increasing prices of livestock products (meat, milk, cheese) as well as of honey prices.
- The coal industry consumes a large amount of wood coming from logging of the valuable trees.
- Most bakery owners prefer Ziziphus tree wood, and this negatively affects beekeeping, livestock and the biodiversity as a whole.
- Increased exploitation of trees in forest lands due to absent regulating policies has occurred in addition to climate impacts ranging from severe droughts, high temperatures and lack of rain calls for urgent intervention.
- As Yemen is located within arid and semi-arid regions over-logging increases the severity of climate shocks and harms the environmental habitats.
- Excessive exploitation of forest trees has led to the destruction of natural vegetation in Yemen.
- There are negative impacts of unorganized grazing and livestock raising activities in forest pastures, as well as the deterioration and erosion of agricultural soil due to floods and winds as the participants of the workshops have pointed out.

7.2 Problems related to coffee cultivation

- The average farm size is small, and traditional farming methods costs barley covered production sales.
- Expansion in Qat cultivation consumes land and water resources especially in mountainous agricultural areas.
- Coffee cultivation in Yafa'a gradually faded as a result of climatic conditions that have already affected most coffee growing areas.
- The difficulty of controlling insects that attack all parts of the coffee tree including the stem, the branches, the leaves and the coffee beans.
- Internal and external migration of skilled labor within the coffee cultivation areas and communities.

7.3 Recommendations[61]

- Propose programs and mechanisms to motivate farms to replace Qat trees with coffee trees, such as providing incentives and support with rainwater harvesting tanks (such actions have been started in Haraz, in some areas Al-Mahwit and in some fields of Dhamar).
- Implementation of an integrated extension program for coffee farmers (rural nurseries - regenerative pruning - coffee breeding - pests and diseases management).
- Improve farmers capabilities to manage coffee harvest and post-harvest operations by providing them with drying and packing mechanisms according to certain specifications.
- Conducting Farmer Field Schools (FFS) in remote areas, villages, or valleys which are involved in coffee cultivation.
- Design a technical and advisory guide for coffee cultivation for each governorate and train a group of farmer-experts to disseminate and apply the content of this guide, provided that the guide includes fruit trees and forests associated with coffee.
- Assistance in establishing nurseries near valleys and areas famous for coffee cultivation.
- Documenting the positive traditional practices and techniques that were applied by Yemeni farmer ancestors in the field of coffee cultivation as well as other useful trees.

[61] Please see the attachment 1 for costs and related budget

- Sharing new skills and successful experiences among farmers through the formation of cooperative bodies (committees, associations and coffee federations).
- Activating tribal legalization orders called “Maraqum” or “Mahjoor” (a customary agreement among rural people that prevents excessive logging or overgrazing in their area) in coordination and cooperation with the general directors of the districts.
- Activate the relevant governmental laws and policies and obtain necessary orders to the security authorities in the local level to implement them.

7.3.1 Available opportunities

The three targeted governorates possess many opportunities to develop and improve coffee cultivation such as the topographical climate factors, remaining soil fertility and traditional irrigation networks. There are also official and organizational efforts being emerging in both the north and south to improve coffee cultivation and marketing operations. The most important opportunities can be summarized under the following headings:

- Coffee is considered one of the promising cash crops in the three targeted governorates. It is noted that there is a trade movement in coffee in the markets in the three governorates due to its quality and good reputation among merchants and owners of private companies.
- Coffee in in the three targeted governorate is grown on terraces with suitable climate and good fertility of soils resulting in a quality product which generates commercial value. It will provide great opportunities in terms of creating job opportunities and can become a driving force toward the social and economic development in the three targeted governorate and in the country as well.
- There are currently areas where residents depend entirely on coffee cultivation, such as Beit Dhiyab, Beit Al-Maliki, Beit Al-Bashri, Kawkaba, and Masabil in the Hafash district in Al-Mahwit and Bani Alawam, Mabyan and Kuhlan Affar in Hajjah as well as Yaher, Alhad and Labu’us in Lahj governorate.

7.3.2 Women plants’ nurseries

According to the outcomes of the workshops, FGDs and KIIs in the three governorates women effectively participate with men in terms of working on coffee farms. Women participate in all agricultural operations, whether in the cultivation of coffee trees or other fruit trees.

A successful example of plants’ nurseries is the agricultural nursery in the city of Rajum in Al Mahwit. The nursery includes thousands of coffee seedlings, forest trees and other fruit trees such as almonds and mango trees which brings which brings cash income to the nursery.

Another example is the Beit Al-Zaqur nursery in the Khubah area of Al-Rajm district. **It is managed and supervised by a group of women**. It sells between 100 and 500 seedlings mainly coffee seedlings, daily. This nursery supports more than 20 families. The nursery is considered a gallery or plant bank due to the diversity of the types of seedlings it contains. Repeating these experiences will bring about a major shift and exciting renewal of coffee trees as well as other useful trees.

7.3.3 Additional recommendations

Maintaining fields by following techniques that are appropriate for each region.

- Seed care and seed selection.
- Maintaining water stream canals and creating tanks to harvest rainwater.
- Following new modern systems in irrigating coffee fields (simple drip irrigation techniques).
- The process of drying coffee berries should be improved (providing suitable drying beds).
- Application of integrated crop management technology in coffee cultivation (intercropping with other trees friendly to coffee such as Taneb, Sidr).
- Establishing associations for coffee producers and building the capacity of existing ones.
- Make use and benefit from ancient experiences of traditional agriculture.
- Capacity building in control of pests and diseases that affect coffee crop start by using Yemen rich indigenous knowledge and the conventional methods.
- Increase the planting of economic fruit trees that can cope with coffee trees, such as guava, papaya and lemon.
- Increase support for coffee farmers to get advantage against Qat cultivation.
- Raising capabilities and developing skills using modern agricultural marketing methods.
- Providing appropriate nurseries and appropriate seedlings for each region.

Attachments

- **Recommended activities and estimated costs**
- **List of participants in the WSs and KIIs**
- **Questionnaire KIIs and coffee and FMNR practices**
- **Overall points and questions followed by FGDs**
- **FGDs with SFD, DRC, FAO, NFDHR and YFCA**
- **Private companies associated activities in the coffee value chain**
- **List of associations active in the coffee Value chain1**
- **Coffee nurseries distributed in coffee production regions**
- **Maps Coffee production areas**
- **Associated pictures from the fields**

Recommended activities and estimated costs

Capacity building and institutional organization the farmers

Type of interventions	Item	Estimated cost USD$	Suggested quantity	Total Amount (USD$)	Targeted districts
Forming of Self-help groups for all 1250 smallholder coffee farmers	Group	1000	9	9000	3 in each governorate
Establishment of village nurseries under the leadership of women and youth	Nursery	8000	9	72000	3in each governorate
Building the capacity of cooperative societies and the Coffee Union	Awareness campaign	3000	6	18000	2 in each governorate
Training of trainers (TOT) on climate-smart and biodiversity-sensitive agriculture	Training course	3000	6	18000	2 in each governorate
Preparing and printing of training manuals for: 1. **Agricultural practices and FMNR** 2. **Rain water harvesting** 3. **Post harvest practices of coffee** 4. **Pest and disease control**	Training manuals	5000	4	20000	4 manuals for all targeted governorates
Preparing and developing a guide to climate-smart and biodiversity-sensitive agriculture (trainer and trainee)	Manual guide	5000	1	5000	1 guide for all targeted governorates
Awareness materials and tools to farmers, ensuring they have access to relevant information and resources **1. Pruning brochure** **2. Pest control brochure** **3. Producing of organic manure** **4. Coffee marketing brochure** **5. Picking and post-harvest brochure**	brochure	700	5	3500	4 brochures for all targeted governorates
Establishing and training of women groups for coffee production (60 women)	Women group	2000	6	12000	two group in each governorate
Training 60 women and men on climate-smart vegetable production to create home gardens and transfer knowledge	Training course	3000	6	18000	2 in each governorate
Training courses Farmer Field Schools 1. **Agricultural practices and FMNR** 2. **Rain water harvesting** 3. **Post harvest practices of coffee** 4. **Pest and disease management and control** 5. **Coffee processing during the drying, peeling, and sorting stages** 6. **Train 25 of women on Producing**	FFS	2000	100	200000	33 FFS in each governorate

of organic manure					
Total				**375500**	

Field interventions

Type of interventions	Item	Estimated cost USD$	Suggested quantity	Total Amount (USD$)	Targeted districts
Terraces maintenance and rehabilitation	M^3	150	900	135000	300 M^3 in each governorate
Maintenance of nurseries	nursery	5000	12	60000	2 in each governorate
Planting of suitable trees to protect slops and terraces of coffee **1. Sidr (*Ziziphus spina-christi*)** **2. Tanb (*Cordia Africana*)** **3. Khermish (*Annona squamosa*)** **4. Al-Shahs (*Dodonaea viscos*)**	Seedlings breeding through regeneration and planting	5	4500	22500	1500 in each governorate
Pits for organic manures	Pit	300	60	18000	10 in each governorate
Rehabilitation of pasturages (pasture seeds and water tanks for animal)	Pasturages areas	3000	9	27000	3 areas in each governorate
Bio gas units plastic	Bio unit	1000	12	12000	4 units in each governorate
Improving of animal small farmyards for household	farmyard	500	100	50000	
Total				**324500**	

Water and Irrigation

Type of interventions	**Item**	**Estimated cost USD$**	**Suggested quantity**	**Total Amount (USD$)**	**Targeted districts**
Cleaning and maintenance of traditional irrigation canals	X times	2000	30	60000	10 in each governorate
Rehabilitation and completion of the existing Rain Water Harvesting units	unit	3000	12	36000	4 in each governorate
Rehabilitation of old cisterns	old cisterns	4500	9	40500	3 in each governorate

Building new cisterns made of mud and closed with polyethylene	Cistern mud closed with polyethylene	3000	30	90000	10 in each governorate
Law cost roof water harvesting tank near by the houses with capacity of 12 M3	tanks	3500	30	105000	10 in each governorate
Construction of low-cost Water harvesting Reservoir with 20 to 30 M capacity and constructed with sand filter	Reservoir	8000	6	48000	3 in each governorate
Establishing 60 small drip irrigation gardens for vegetable production and operating them at the project sites (to targeted the poor farmers).	Irrigation system	1000	60	60000	20 in each governorate
Providing farmers with Conveyance pipe systems to save about 20 % from the irrigated water amount.	pipes	1200	60	72000	20 in each governorate
Total				**511500**	

Infrastructure, post-harvest and marketing

Type of interventions	Item	Estimated cost USD$	Suggested quantity	Total Amount (USD$)	Targeted districts
Construction of roads to fields, water sources and markets	X*100 m	5000	20	100000	Lamb sum
Rehabilitation of rural market areas	market	5000	8	40000	
Establishing and training of marketing groups for coffee (packing and marketing)	Marketing group	1000	6	6000	2 in each governorate
Providing farmers with pruning materials (pruning knives and saws different forms, protection gloves, sterilization liquid, binding materials etc)	**pruning materials**	6000	3	18000	Lamb sum
Providing farmers with draying beds for coffee draying	**draying beds**	150	1000	150000	30 in each governorate
Total				**314000**	

Total costs for all field activities

Total	**= 1525500 USD** **= 61.02% of the total budget**

List of participants in the WSs and KII					
Name	Governorate	Position	Institution	KIIs	WS
Muhammad Nasser Al-Alawi	Al-Mahwit	Agr. Director Tawilla Dist.	Agr. Office	1	1
Ali Hajar	Al-Mahwit	Plant protection Sp	Agr. Office	1	1
Naguib Ahmed	Al-Mahwit	Farmer	Alrugum Ag. Assoc	1	1
Hamid Nasser Al-Shahdi	Al-Mahwit	Extensionist	Agr. Office	1	1
Muhammad Ali Shawil	Al-Mahwit	Extensionist	Agr. Office	1	1
Muhammad Ahmed Awad	Al-Mahwit	District director	Local Autority	1	1
Yahya Naji Shayea	Al-Mahwit	Agr. Director Shibam Dist.	Agr. Office	1	1
Ahmed Mohamed Rajeh	Al-Mahwit	Irrigation director	Agr. Office	1	1
Abdul-Jabbar Al-Azab	Al-Mahwit	District director	Local Autority	1	1
Muhammad Mohsen Al-Sufi	Al-Mahwit	Human Res. Director	Local Autority	1	1
Abdul Rahman Ismail	Al-Mahwit	Irrigation Department	Agr. Office	1	1
Adi alfil	Al-Mahwit	نائب مدير إدارة الري	Agr. Office	1	1
Muhammad Saghir Muhammad Omar	Al-Mahwit	Marketing dep.	Agr. Office	1	1
Abdo Ahmed Al-Nazari	Al-Mahwit	Extensionist	Agr. Office	1	1
Muhammad Mohsen Al-Alayli	Al-Mahwit	farmer		1	1
Yahya Saleh Al-Maamari	Al-Mahwit	Farmer		1	1
Abdullah Al-Junaid	Al-Mahwit	Agr. Director Al Rujum Dist.	Agr. Office	1	1
Muhammad Al-Dhabhani	Al-Mahwit	Extension director	Agr. Office	1	1
Ahmed Shoei Rizk	Al-Mahwit	farmer	مزارع	1	1
Amin Al-Baqasha	Al-Mahwit	Farmer	مزارع	1	1
Waddah Ali Hassan	Al-Mahwit		Agr. Office	1	1
Abdullah Ali Jameel	Al-Mahwit	Nursery director in Alrujum	Agr. Office		1
Omar fath hizam	Al-Mahwit	Project department	Scmcha		1
Mohamed Omar	Al-Mahwit	Project department	Scmcha		1
Wael Al-Sayadi	Al-Mahwit	Project department	Scmcha		1
Mohammed Mohsen	Al-Mahwit	Project department	Scmcha		1
Ali Muhammad	Al-Mahwit	Project department	Scmcha		1
Adel Salih	Al-Mahwit	Project department	Scmcha		1
Muhammad Ali Heba	Al-Mahwit	Project department	Scmcha		1
Muhammad Mohsen Al-Sufi	Al-Mahwit	Project department	Scmcha		1
Imran Muhammad Al-Sufi	Al-Mahwit	Project department	Scmcha		1
Hassan Ahmed Al-Qadimi	Al-Mahwit	Project department	Scmcha		
Bakil Muhammad Ali Radman	Al-Mahwit	Project department	Scmcha		1
Akram Ahmed Al-Houthi	Hajjah	Local Autority	Local Autority		1
Ibrahim Zaid Amer	Hajjah		Scmcha		1
Ismail Musa Ahmed	Hajjah	Agr. Department	Scmcha		1
Hassan Muhammad Saqeel	Hajjah		Collage of agriculture	1	1
Hassan Muhammad Al-Ashwal	Hajjah	Gen. director in Bani Alawam	Local Autority	1	1
Hammoud Saleh Ousha	Hajjah		Agr. Office	1	1
Khaled Ahmed Al-qaafi	Hajjah		Agr. Office		1
Khaled Yahya Abdullah Al-Qadi	Hajjah	Project department	Scmcha		1
Riad Mahdi Saleh	Hajjah	Media spe.	Scmcha		1
Abdul Rahman Yahya Al-Malhani	Hajjah	GD of planning	planning office		1
Abdul Azim Ismail	Hajjah		Agr. Office	1	1
Abdo Abdullah Dahshoush	Hajjah		Agr. Office		1
Allan Ali Fadael	Hajjah	The GD of SCMCHA in Hajjah	Scmcha		1
Ali Ahmed Yahya Mukhtar	Hajjah	M&E	Scmcha		1
Ali Muhammad	Hajjah		Agr. Office		1
Majid Ahmed	Hajjah	epe. Of scmcha in Bani Alawa	Scmcha		1
Mujahid Muhammad Mahdi	Hajjah		VHI		1
Muhammad Ahmed Yahya Mukhtar	Hajjah	Operation department	Scmcha		1
Muhammad Hussein Al-Qili	Hajjah		Agr. Office	1	1
Muhammad Ali Al-Qadi	Hajjah	geve. Officer	planning office		1
Muhammad Nasser Saifan	Hajjah		Agr. Office		1
Muhammad Yahya Ousha	Hajjah		Collage of agriculture	1	1
Mahdi Muhammad Sawada	Hajjah	community sensitization			1
Nabil Muhammad Yahya Majli	Hajjah		Collage of agriculture	1	1
Nabil Mahmoud Al-Shibari	Hajjah	farmer	farmer	1	1
Najib muhamad hamuwd nashir	Hajjah	agr. Director in Bani Alawam	Agr. Office	1	1
Yahya HIssi Shu'i	Hajjah	Repe. Of scmcha in Bani Qais	Scmcha		1
Abdullah	Hajjah	farmer	مزارع		
Ahmed bin Ahmed Hassan	Lahj	farmer	مزارع	1	1
Ahmed bin Ahmed Mohsen Tairam	Lahj	agr. Engineer	Agr. Office in Tuban		1
Ahmed Saeed Jazem	Lahj	agr. Engineer	Agr. Office in Tuban		1
Ahmed Abdullah Mohammed	Lahj	agr. Engineer	Agr. Office in Tuban		1
Intisar Hussein Ahmed Al-Hajj	Lahj	agr. Engineer	Agr. Office in Tuban		1
Inshirah Abdullah Mustafa	Lahj	agr. Engineer	Agr. Office in Tuban	1	1
Abu Bakr Ahmed Al-Arasha	Lahj	agr. Engineer	Agr. Office in Tuban	1	1
Balqis Abdo Ahmed Ali Al Sharabi	Lahj	agr. Engineer	Agr. Office in Tuban	1	1
Jalal Salem Abdullah Saleh	Lahj	farmer	مزارع	1	1
Jawaher Hamid Salam	Lahj	agr. Engineer	Agr. Office in Tuban	1	1

Hassan Abdel Razek Hassan	Lahj	agr. Engineer	Agr. Office in Tuban		1
Reda Abdullah Abdul Majeed	Lahj	agr. Engineer	Agr. Office in Tuban		1
Saeed Saleh Salem	Lahj	agr. Engineer	Agr. Office in Tuban	1	1
Samar Muhammad Fadl Hassan	Lahj	agr. Engineer	Agr. Office in Tuban	1	1
Samra Naji Salem	Lahj	agr. Engineer	Agr. Office in Tuban	1	1
Sherine Ahmed Mohamed	Lahj	agr. Engineer	Agr. Office in Tuban		1
Saleh Muhammad Al-Sunaidi	Lahj	agr. Engineer	Agr. Office in Tuban	1	1
Abdul Hakim Ayyash Ahmed Nasser	Lahj	agr. Engineer	Agr. Office in Tuban	1	1
Adnan Abdullah Mihdhar Nasser	Lahj	agr. Engineer	Agr. Office in Tuban		1
Fatima Muhammad Abdullah	Lahj	agr. Engineer	Agr. Office in Tuban	1	1
Laila Khaled Saleh Ali	Lahj	agr. Engineer	Agr. Office in Tuban	1	1
Abdel-Ilah Ahmed Abdel-Qawi	Lahj	Planning director	Planning office	1	1
Nizar Saleh Ali Al Mariri	Lahj	farmer	مزارع	1	1
Muthanna Qasim Muhammad Hassan	Lahj	agr. Engineer	Agr. Office in Tuban	1	1
Muhammad Awad Qasim	Lahj	agr. Engineer	Agr. Office in Tuban	1	1
Mukhtar Ahmed Abdullah	Lahj	farmer	مزارع	1	1
Mustafa Abdel Khaleq Saeed	Lahj	agr. Engineer	Agr. Office in Tuban	1	1
Najat Abdullah Ali Ahmed	Lahj	agr. Engineer	Agr. Office in Tuban	1	1
Nour Fares Ali	Lahj	agr. Engineer	Agr. Office in Tuban		1
Hashem Jaafar Abdullah Al-Saqqaf	Lahj	agr. Engineer	Agr. Office in Tuban		1
Wafa Muhammad Nasser Yahya	Lahj	agr. Engineer	Agr. Office in Tuban		1
Awas Mohsen Thabet bin Thabet	Lahj	farmer	مزارع	1	
Nader Qasim Abu Bakr	Lahj	farmer	مزارع	1	
Yahya Abdullah Talib	Lahj	farmer	مزارع	1	
Saleh Alawi Gibran bin Awad	Lahj	farmer	مزارع	1	
Muhammad Abdel Hafez Al-Yahri	Lahj	farmer	مزارع	1	
Mohsen Naji Al-Harbi	Lahj	farmer	مزارع	1	
Nayef Ali Saeed Nayef	Lahj	farmer	مزارع	1	
Muhammad Fadl Muhammad Nasser	Lahj	farmer	مزارع	1	
Jalal Abdullah Saleh Muhammad	Lahj	agr. Engineer	مكتب الزراعة - تبن	1	
Ali Afif Ahmed Saeed	Lahj	farmer	مزارع	1	
Abdel Salam Nasser Abdel Qawi Thabet	Lahj	farmer	مزارع	1	
Qahtan Mohsen Qahtan Afif	Lahj	farmer	مزارع	1	
Saleh Qasim Abdel-Qawi Marhi	Lahj	farmer	مزارع	1	
Qasim Saleh Thabet	Lahj	farmer	مزارع	1	
				64	90

KIIs and agricultural coffee and FMNR practices

1. ما هو النمط الزراعي الأكثر شيوعاً لإنتاج البن والمحاصيل الأخرى؟

المحصول	حيازات صغيرة اقل من 1 هكتار	متوسطة 1 هكتار إلى 5 هكتار	كبيرة أكبر من 5 هكتار
البن			

2. أهم العمليات الزراعية (مع بعض التفاصيل إن أمكن)

العمليات الزراعية	البن (الأشهر المناسبة في السنة مثلا يناير الى مارس. او فقط مايو وهكذا)	مشاركة المرأة (نعم) (لا)
تحضير وتجهيز الأرض للزراعة		
تجهيز الشتلات		
مكافحة الآفات (رش المبيدات)		
التقليم		
التعشيب		
الري		
نمو الثمرة		
الحصاد		
معاملات ما بعد الحصاد		
التسويق		

3. الطريقة المستخدمة للري (مطري أو ري بطريقة أخرى) ما هي الطريقة الأفضل لزيادة إنتاج هذه المحاصيل؟

النظام الزراعي	البن (نعم ....لا)	الفاكهة
الري المطري		
الزراعة المروية		

4. ماهي المسافات البينية؟

قياس المسافات البينية	البن المسافة سنتمتر /متر
المسافة بين الصف والصف في حالة الزراعة الأحادية	
المسافة بين الشجرة والشجرة في الزراعة الأحادية	
المسافة بين الصف والصف في حالة وجود زراعة بينية	
المسافة بين الشجرة والشجرة في حالة وجود زراعة بينية	

5. ماهي محاصيل الزراعة البينية في حقول البن؟

6. ماهي التغيرات المناخية التي لوحظت خلال الـ 5 الى 10 السنوات الماضية (الطقس، الأمطار، الجفاف/ التصحر، ارتفاع درجة الحرارة)؟؟ ما هو التأثير المحتمل لهذه التغيرات على البن والفاكهة والأشجار الحراجية؟

7. اذكر الهامش التجاري (السعر أو النسبة المئوية) لمختلف الفاعلين في سلسلة القيمة؟

الفاعلين في سلسلة الإنتاج	**البن (السعر أو %)**
المزارعين (السعر في بوابة المزرعة)	
المجمعين	
التجار	
معاملي ما بعد الحصاد	
تجار الجملة	
تجار التجزئة/المصدرين	
المستهلك	

8. دور المرأة في الأنشطة الزراعية وخصوصاً في البن والفاكهة(نعم/ لا، اختيارات مما يأتي:)

أ= العمالة الأسرية: **نعم .....(.....)...لا....(..... ..)**، ب= اختيار المحصول (صانع قرار **نعم .....(.....)...لا....(..... ..)**، ،

ج= حفظ السجلات: **نعم .....(.....)...لا....(..... ..)**، ، د= التسويق: **نعم .....(.....)...لا....(..... ..)**، ه= أخرى، اذكرها

9. دور المرأة كجزء من العمالة الأسرية

الأعمال	**الجواب (نعم/ لا)**	**الأعمال**	**الجواب (نعم/ لا)**
التنظيف (للأرض والمغارس والشتلات)		رش المبيدات	
تجهيز التربة		العزيق	
زراعة المغارس والشتلات		الفرز والتبزيغ والتعبئة	
التعشيب		الشحن والتفريغ	
تركيب المعدات		التسويق	
أخرى، نرجو الذكر بالتفصيل:			

10. ما هي أهم المعوقات التي تمنع المزارع من زراعة البن؟؟.

Overall points and questions followed by FGDs

Best practices for adoption of FMNR in Yemen	أفضل الأساليب لتبني تقنية التجديد الطبيعيFMNR الذي يقوم به المزارع في اليمن
Areas of coordination with stakeholders and other projects.	تحديد أوجه التنسيق مع المشاريع وأصحاب المصلحة الآخرين
Assess the current state of the coffee and fruit cultivation sector in Yemen, including historical, economic, and international contexts	تقييم الوضع الحالي للزراعة في قطاعي البن والفاكهة في اليمن متظمناً السياق التاريخي والاقتصادي والسياق الدولي
Identify potential partners and stakeholders who could contribute to the success of the project, including universities, other projects in the field, and local communities.	تحديد الشركاء الأساسيين والجهات ذات العلاقة والذي يمكن ان يسهموا في نجاح المشروع بما فيها الجامعات والمشاريع المشابهة الأخرى والمجتمعات المحلية
How are the direct beneficiaries selected, and by whom? What criteria exist for selecting these beneficiaries?	كيف يمكن اختيار المستفيدين المباشرين ومن الذي يختارهم؟ وما هي معايير الاختيار للمستفيدين؟
Which, and how many stakeholders will be involved? What are their backgrounds and interests?	ما هي الجهات التي يمكن اشراكها ؟ ما هي اهتماتها وخلفيتها؟
How strong is the various stakeholders' support for the project, for example, in terms of their own contribution? In what ways might they influence the project?	ما هي قدرات الجهات ذات المصلحة في دعم المشروع؟ وذلك فيما يتعالق بمساهماتهم في إنجاح المشروع؟
What relevant professional, methodological and political competencies, both at an individual and an organizational level, will be further developed?	ما هي المهارات الفنية التي يمكن دعمها وتطويرها؟
To what extent is grazing an issue in the 3 governorates? To what extent can community activities deteriorate project efforts? Can FMNR-induced consultations and agreements automatically raise awareness and protect the trees?) Would fencing play a cost-benefit role? Can this approach build an independent FMNR movement?	الى أي مدى يشكل الرعي تحدي في المحافظات الثلاث؟ والى أي مدى تؤثر أنشطة المجتمعات سلباً على أنشطة المشروع؟ هل يمكن عمل التزامات فيما يتعلق بأنشطة التجديد الطبيعي لرفع درجة الوعي في الحفاظ على الأشجار؟ هل عمل الحواجز ذا جدوى؟ هل يمكن لهذا التصور ان يكون تجديد طبيعي مستقل بحد ذاته؟
Partners' commitments regarding project design and project proposal preparation, and subsequently in project implementation	مساهمة الشركاء فيما يتعلق بتصميم المشروع وتقديم المقترح وكذا مساهمتهم في تنفيذ أنشطة المشروع
Is there a benefit from having FMNR and coffee farming in the same plots / is it possible at all? or should it be different plots, e.g. coffee on terraces and FMNR on other hills?	هل هناك فائدة من ادخال تقنية التجديد الطبيعي وزراعة البن في نفس المنطقة؟ هل هذا ممكن؟ او يجب ان تتم بطريقة مختلفة مثلا دعم زراعة البن في المدرجات وتقنية التجديد في حقول أخرى؟
Do the beneficiaries and other stakeholders have a common understanding of the problems, prioritizing process and objectives of the	هل المستفيدين واصحاب المصلحة الاخرين عندهم تصور متطابق عن المشكلة؟ الأوليات وهدف المشروع؟ هل هناك

project? Do the interests of other stakeholders align? Do any conflicts of interest exist?	تطابق في اهتمامات ذات المصلحة الاخرين بالموضوع؟ هل توجد تضارب في المصالح؟
What potential does each beneficiary have for self-help? How well are the beneficiaries equipped for self-help? How can local problem-solving capabilities be improved?	ماهي مقدرات المستفيدين فيما يتعلق بالمساعدة الذاتية؟ كيف يمكن دعم المستفيدين وباي أدوات لتطوير المسعدة الذاتية؟
What are the sales structures for coffee farmers from the targeted Governorates (What traders) do they sell it to and for which price? Where is the coffee going and for which price is it sold by the traders? Is anything exported, and for which price?	كيف يبدو عملية البيع للبن من المحافظات المستهدفة؟ (من هم التجار) الأسعار التي يبيعون بها؟ الى اين يذهب البن وبأي سعر يباع عن طريق التجار؟ هل هناك استراد للبن وباي سعر؟
Is there a local market for coffee (any coffee sold to customers on local market? any coffee shops within the governorate?)	هل هناك سوق محلي لتسويق البن (كيف يتم بيع البن للزبائن في السوق المحلي؟ هل توجد متاجر للبن في المحافظة؟)
The main concerns and expectations that the participants have during the workshop consultations	اهم النصائح والتوقعات التي سوف يطرحها المشاركون في الورشة
How can FMNR contribute to conflict resolution?	كيف يمكن ان يساهم مشروع التجديد الطبيعي في حل النزاعات؟
What existing local potential, structures (institutions, networks, umbrella organizations etc.) and social mechanisms can be built on? What gaps have been identified in the system?	ما هي البنية التحتية الاساسية المتوفرة التي يمكن ان يبنى عليها (مؤسسات، شبكات، منشاءات تعمل كحماية اومظلة ...الخ) وما هي الفجوات التي تم تحديدها في هذا الموضوع؟
Is there a traditional land management system which does or used to dictate who, when and in what manner grazing took place?	هل هناك نظام للإدارة الطبيعية والذي يعطي التعليمات اين مسموح ان يتم الرعي وأين ممنوع؟

FGDs with SFD, DRC, FAO, NFDHR and YFCA

Name	Institution	Position	KII/ FGD	
Mahmood Maqtary	SFD	Head of the agriculture unit	FGD	
Hassan Basha	SFD	Horticulture and coffee expert		
Nassr Alasbahy	SFD	Agr. expert		777957472
Nabeel Ali Alhela	SFD	Infrastructure		
Fuad Almashreqy	SFD	Agroforestry and environment expert		774800437
Yaser Ghallab	SFD	Infrastructure for soil and water		777759725
Fuad Alsayadi	DRC	Head of livelihood and resilience programs	FGDs	
Abdul Rahamn Alasaly	DRC	Participatory approach specialist		774852807
Abdul wakeel Al Saqqaf	DRC	Logistic		7743244302
Ahmad Zuhaeer	DRC	Warehouses manger		771001120
Khaled Al-Ghader	DRC	Administrative Manager		777275901
Mohammed Almutawakel	DRC	Economic recovery specialist	FGD	776865200
Mohamed Alsalehy	DRC	HR		774996779
Mohamed Alhaddy	DRC	IT		777725959
Mohamed Jameel	DRC	IT		775666785
Muneer Assaln	DRC	Admin		777443364
Abdul Momeen Shja'a Aldeen	FAO	Agroforestry sytems	FGD	
Adel Zulaeel	FAO	Farmer Field Schools (FFS) specialist		
Abdul Kareem Alsabry	FAO	Irrigation and rain water harvesting specialist		
Mohamed Abdulla	NFDHR	Executive director	FGD	
Adel Husain	NFDHR	Deputy Executive director		

Khaled Al-Othmany	NFDHR	Deputy Executive director for programs		
Najwa Abdul Rahman	NFDHR	Program department		
Dr. Maher Mua'at	NFDHR	Dep. Director		
Dr. Abdul Rahman Salah	NFDHR	Agricultural expert		
Ahmad Alhajam	YFCA	Head of FSL program	FGD	
Mohamed Rasse'e	YFCA	Food security field coordinator		776010524
Mohamed Nabeel Alwade'ey	YFCA	Food security department data cleaning and data entry		777634200

Private companies associated activities in the coffee value chain[1]

	Name of company	activities in the CVC	address	Phone number	e-mail
1.	Al-Kbous for trade,industry and investment	Coffe export	Sana'a-saif bin dhi yazan st	777710000/01270800	kabos@y.net.ye
2.	Al-Hamdani for Yemeni coffee and general agencies	Production and export	Sana'a – alzubairi st	777777418/214463/201957	hamdanimocha@gmail.com
3.	Al hamasi Est. for export and production	Production and export	Sana'a – 45 st	777000052	alhamasi@yahoo.com
4.	Al-azzi Idris Al-Idrissi industry	export	Sana'a – adran's house	735755326	www.alazzi.com
5.	Al-Qima coffee	export	Sana'a – al geria st	733202590/777414166	
6.	Al Emadi for trade and export	export	Sana'a – alramah st- near azal society	777120424/777294950	Jalal78685@gmail.com emadcoffee@gmail.com
7.	Mokha root for luxury Yemeni coffee	export	Sana'a	771705677	AALIRADI@MokhaRout.com
8.	Mocha mail	Coffee shop and export	Sana'a – alkor st - near Lebanon's university	773306466	ali@mochamail.com
9.	Yemen coffee processing company	export	Sana'a – adran's house	733226225	yememcoffee@y.net.ye
10.	Sowaid for trade, export and import	export	Sana'a – western ring road	771718860/01471954	Sowid-4@y.net.ye
11.	Mocha hunters	export	Sana'a – near bin aziz apartments	771227768	Hussein@mochahunters.com
12.	Talok women's coffee association	Production and export	Taiz- al misrach	713871203	
13.	Al hajj mohammed sowaid and his sons		Sana'a – ring road	471951	sowaid@y.net.ye

[1] [1] Yemen Strategy 2020- 2025 for development of the coffee sector, MAI, 2020

14.	Meras company for coffe study		Sana'a	771069699	
15.	Port of mokha for specialty coffee		Sana'a – Nouakchott st	777087097	noraddin@portofmokha.com
16.	Yemeni quality foundation for specialized coffee	Production and export	Sana'a – alzubairi st	770906944	yemenquality@gmail.com
17.	Bani Sinan agricultural cooperative association	Production and export	Sana'a – hale st	772232235	banisinan@gmail.com

List of associations active in the coffee Value chain[1]					
No	Association name	Specialization	address	Phone number	E-mail
1.	Alruad association	Coffee and honey	Sana'a-al-hayma al-kharjia- bani suliman-house of ahlol	772919457/771422990	
2.	Bni Sinan association	Agriculture and production	Taiz-bani hammad - al mosat	772232235/777861606	Banisinan2002@gmail.com
3.	Office for raising the standers of farmers in east of haraz	Agriculture and production	Sana'a-haraz	774247553	A60noman11052@gmail.com
4.	Al-nmou agriculture cooperative association	Coffee and honey	Sana'a-al-hayma exetrnal	777834390/773808508	
5.	Bura agriculture cooperative association	production	Al hodida bura	777933726	stoncoffeebaca@gmail.com
6.	Yemeni coffee association	export	Sana'a	270800	
7.	Hasban association	production	manakhah	777339496	
8.	Pollution association	production	Dhamar-otma	777322932	
9.	Otma association	production	Dhamar-otma	777322932	
10.	Bani mora association	production	manakhah	777369093	
11.	Al- nokhba association	production	Al hayma internal	773679078	
12.	Al-amtiyaz association of coffee producers	Production and export	Sana'a -bani matter-boqlan vallley	771466497/773111875	
13.	Habsh agriculture association	production	otma	770602053	
14.	Bani fadel association	production	Dhamar- anes -bani fadel	770735356	
15.	Quality association	production	Al hayma external	770906944	

[1] Yemen Strategy 2020- 2025 for development of the coffee sector, MAI, 2020

16.	Development agriculture cooperation association	production	Al hayma external	777443980	
17.	Al-mektar association	production	Sana'a- haraz -bani ismail	777474856	
18.	Development association	production	Al hayma external	770200759	
19.	Al-amal association	production	manakhah	771172329	
20.	Al-takadom association	production	Al hayma external	771422990	
21.	Al-aqeeq association	production	raymah	777962336	
22.	Al-waad association		Al hayma external	777760808	

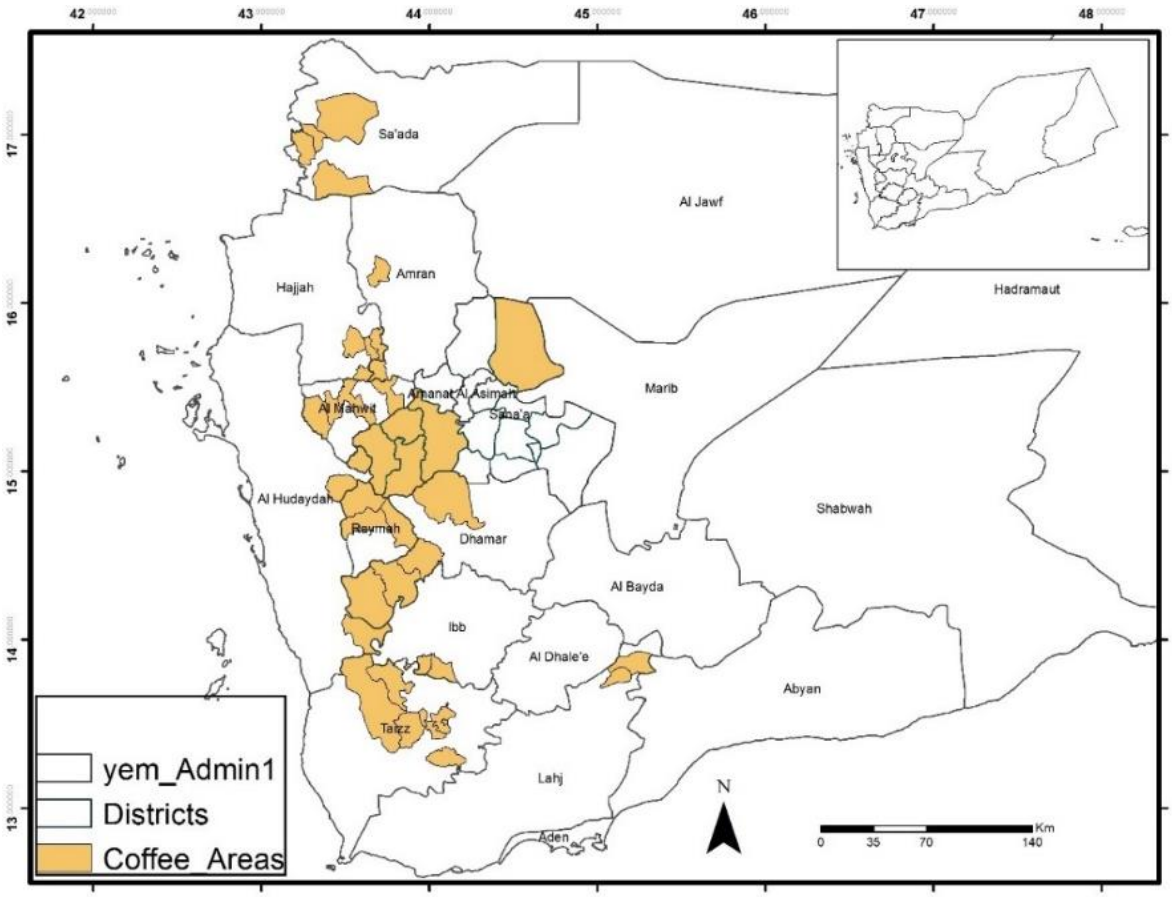
Coffee nurseries distributed in coffee production regions and the approximately capacity coffee seedling/ Year[1]

No	Name of nursery	Governorate	District	App. Capacity coffee seedling/ Year
1	Ibb nursery	Ibb	Ibb City	600000
2	Alma'asarah	Hajjah	Hajjah city	50000
3	Almaqash	Sa'adah	Alsafra	50000
4	Alrujum	Al-Mahwit	Alrujum	20000
5	Lahemah	Al-Mahwit	Al-Mahwit	30000
6	Mausanah	Sana'a	Sa'afan	30000
7	Alrasa'ah	Sana'a	Alhaimah Al-Kharejiah	40000
8	Al-Rebat	Raimah	Al-Salafiah	10000
9	Aloojah	Raimah	Al-Ja'afariah	10000
10	Adn	Raimah	Al-Jabeen	5000
11	Blad Alta'am	Raimah	Blad Alta'am	5000
12	Jabal Al-Sharq	Dhamar	Al-Sharq	50000
13	Hamam Ali	Dhamar	Al-Manar	5000
14	Talooq	Taiz	Almesrakh	5000
15	Bani Hammad	Taiz	Almawaset	10000
16	Alhad	Lahj	Alhad	5000
17	YASAD[2]	Sana'a	Sana'a city	15000
	Total			940000

There are many small village and private coffee nurseries not included in the table

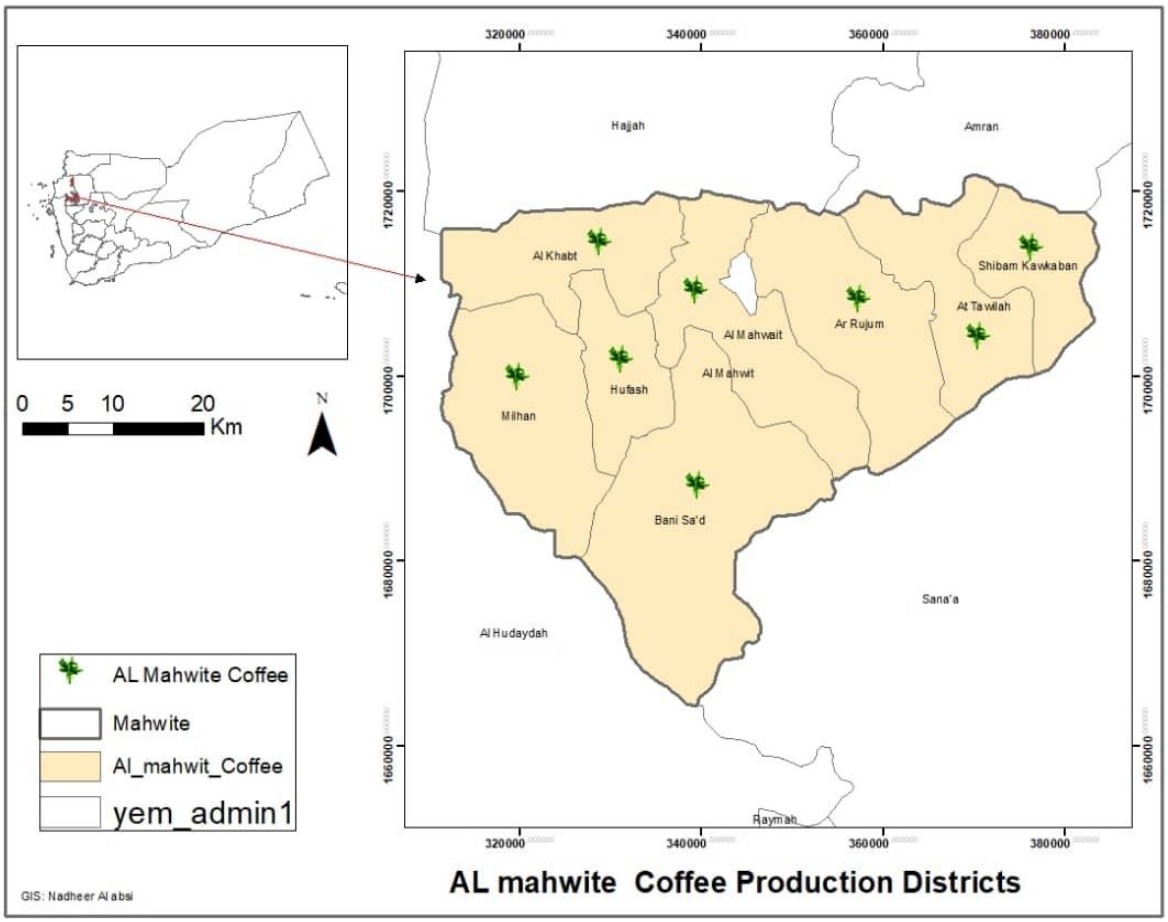
[1] https://www.scribd.com/document/661259765/VC-Analysis-Qat-Coffee-EN-1-August-2022

[2] Yemeni Association for Sustainable Agricultural Development, the nursery supposed only for research activities.



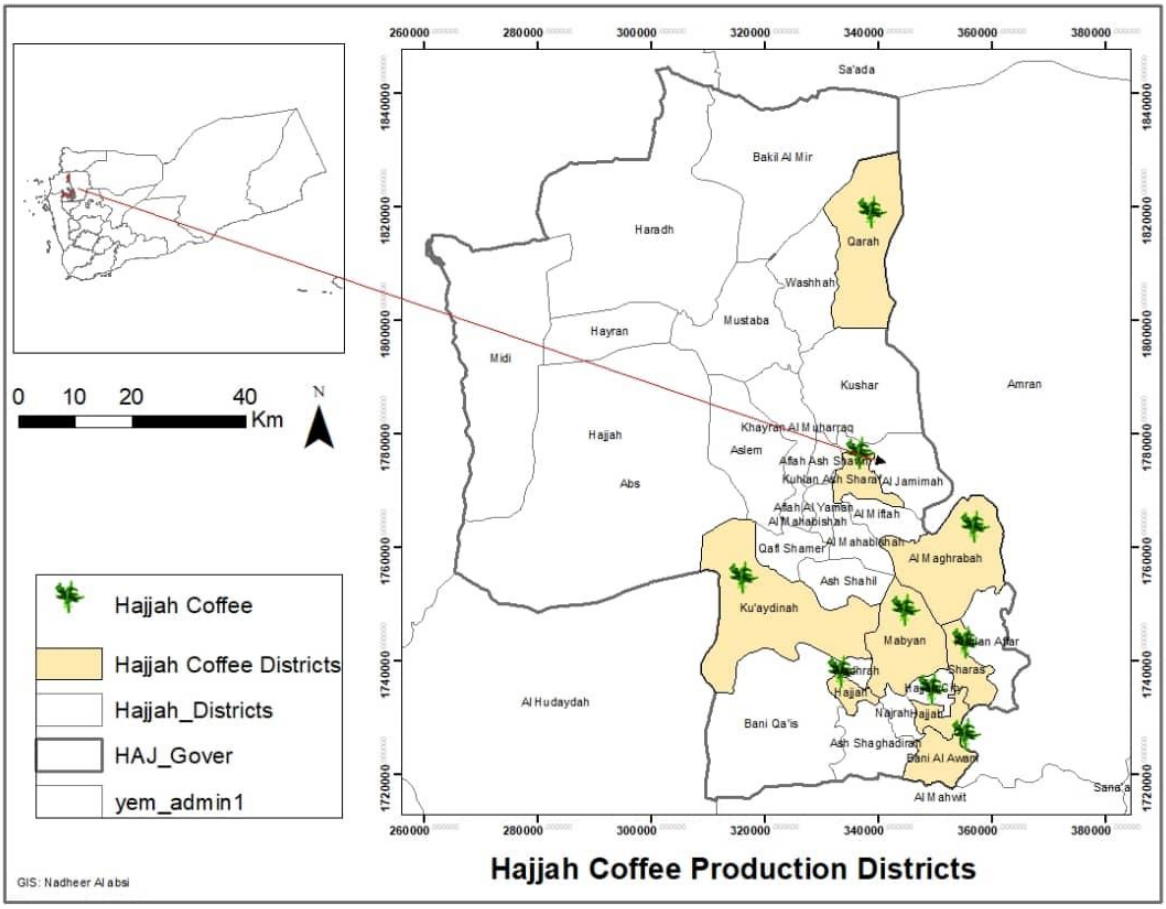
Yemen Coffee Production Areas [1]

[1] The maps have been developed based on data in the published notebook "Strategy for development of the coffee sector, by MAI in Sana'a, 2020"



The most important trees and shrubs that are friendly to coffee trees in the targeted areas of Al- Mahwit

Trees and shrub associated with	**Frequency**	**%**
Tanb, Cordia africana Lam,	18	37.42
Papaya, Carica papaya	8	16.67
Mango, Mangifera indica	6	12.50
Guava, Psidium guajava	6	12.50
Tamarind, Tamarindus indica	2	4.17
Rhus sp.	1	2.08
some other fruit trees	1	2.08
Daraj	1	2.08
Ficus vasta	1	2.08
Banana	1	2.08
Moringa oleifera	1	2.08
Sorghum	1	2.08
Breonadia salicina	1	2.08
Total	48	100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Haradh
Qarah
Washhah
Mustaba
Hayran
Midi
Kushar
Amran
Hajjah
Khayran Al Muharraq
Aslem
Aflah Ash Sharqi
Kuhlan Ash Sharaa
Al Jamimah
Abs
Aflah Al Yaman
Al Mahabishah
Al Miftah
Qafl Shamer
Al Mahabishah
Al Maghrabah
Ash Shahil
Ku'aydinah
Mabyan
Kuhlan Affar
Sharas
Hajjah
Najrah Hajjah
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Bani Qa'is
Ash Shaghadirah
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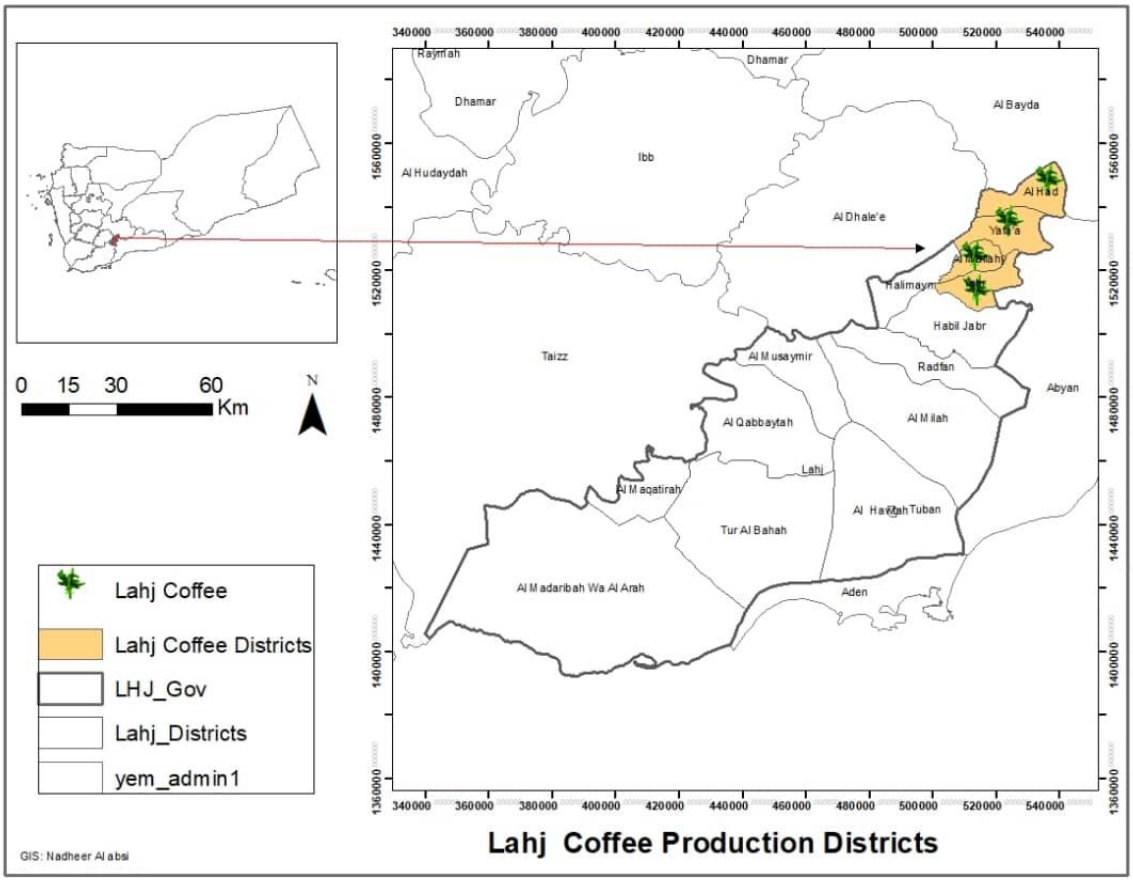
Hajjah Coffee Production Districts


Rayimah
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Dhamar
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Ibb
Al Hudaydah
Al Dhale'e
Al Had
Yafa'a
Al Milahah
Halimayn
Habil Jabr
Taizz
Al Musaymir
Radfan
Abyan
Al Qabbaytah
Al Milah
Lahj
Al Maqatirah
Al Hawtah
Tuban
Tur Al Bahah
Al Madaribah Wa Al Arah
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Lahj Coffee
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LHJ_Gov
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GIS: Nadheer Alabsi
Lahj Coffee Production Districts






Pictures from Field activities and visits in Lahj governorate






Pictures from Field activities and visits in Hajjah governorate

Pictures from Field activities and visits in Al-Mahwit governorate