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INVESTMENT & PRIVATE SECTOR ENGAGEMENT

WADI HAJR AGRICULTURAL REVITALIZATION

Funded by:

Kingdom of the Netherlands

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Hayel Saeed Anam & Co.

IMPACT CONSULTING

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EXECUTIVE SUMMARY

The Wadi Hajr Watershed in Hadhramaut, Yemen, is a region of strategic importance for agriculture and water resource management, supporting the livelihoods of over 88,000 residents with approximately 8,843 hectares of arable land and an annual runoff of over 349 million cubic meters. Despite its fertile soils, relative water abundance and a strong tradition of crop and livestock farming, the area faces significant challenges that limit its agricultural productivity and investment potential.This study, based on extensive desk research, focus group discussions and interviews with more than 320 farmers, landowners and private sector actors, assesses the current landscape and identifies pathways to foster private sector engagement in the project "Sustainable Watershed Management through Reinforced Governance, Resilience and Regenerative Agriculture in Wadi Hajr". The research highlights both the region's untapped potential and the barriers that must be addressed to achieve sustainable, inclusive growth.

This study, based on extensive desk research, focus group discussions and interviews with more than 320 farmers, landowners and private sector actors, assesses the current landscape and identifies pathways to foster private sector engagement in the project "Sustainable Watershed Management through Reinforced Governance, Resilience and Regenerative Agriculture in Wadi Hajr". The research highlights both the region's untapped potential and the barriers that must be addressed to achieve sustainable, inclusive growth.

Key findings related to the primary objectives of the study:

The private sector's current involvement in Wadi Hajr agriculture is limited, but there is growing interest in opportunities such as input supply, grain cultivation (especially wheat), greenhouse farming and value-added processing. Investors express concerns about land rights, lack of infrastructure and limited market access, but recognize the potential for profitable engagement if these issues are addressed. This report identifies several high-potential investment areas for the private sector, including modern irrigation systems, date and fruit processing, livestock and feed production, beekeeping and renewable energy for agriculture. Public-private partnerships, capacity building and targeted financial incentives are essential to unlock these opportunities.

There is potential to enhance the value chain for key agricultural products, such as dairy products, vegetables, fruits and honey, through improved processing, packaging and marketing. Value chain actors from the private sector could provide value and leverage opportunities.

KEY STATISTICS

88,000
Residents

8,843
Hectares of Arable Land

349M
Cubic Meters Annual Runoff

The following potential agriculture development investment opportunities in the Hadhramaut Valley Watershed Development Project with growth potential for the private sector have been identified:

High-Value **Crops**

Significant potential exists in cultivating and developing value chains for crops like **dates**, **sesame**, **mangoes**, **bananas**, **onions** and **tomatoes**.

Protected **agriculture**

Investment in **greenhouses** and **hydroponics** can multiply yields for high-demand vegetables like tomatoes, cucumbers and peppers, enabling off-season production.

Efficient **irrigation**

Supplying and implementing **drip** and **sprinkler irrigation systems** is a major opportunity.

Livestock

With sheep and goats constituting over 60 percent of livestock units, there are opportunities in **breed improvement**, **feedlot operations**, **dairy processing and poultry farms**. Local production of fodder crops (alfalfa, sorghum) can support this.

Water arvesting **& storage**

Investment in well drilling, canal rehabilitation and water storage solutions (e.g., for floodplains) is critical.

Technology **& inputs**

Opportunities abound for supplying **modern irrigation systems**, improved seeds, fertilizers, pesticides and mechanization.

Processing **facilities**

Opportunities exist for establishing facilities for **date processing** (syrup, paste), **juice/concentrate production** (mango, banana, citrus), **oil extraction** (sesame, sunflower), **flour blending**, jam and pickles.

Honey **production**

The presence of Ceder trees supports high-quality honey production. Investment in **modern beekeeping**, **branding** and **packaging** can tap into export potential, particularly to Gulf markets.

Contract farming **& cooperatives**

Facilitating contract farming and establishing cooperatives can address land fragmentation and improve access to finance and markets.

Post-harvest **infrastructure**

Investment in cold storage, packaging facilities and improved logistics is crucial to reduce post-harvest losses and enhance market access, especially given current marketing challenges and poor road conditions.

Export **opportunities**

Focusing on high-value crops such as dates and honey presents opportunities for export growth. Potential initiatives could aim to rehabilitate palm trees and beekeeping, substantially increasing farmers' incomes while tapping into premium markets.

T he study has found barriers that limit the participation of the private sector in agricultural revitalization in Wadi Hajr. Agricultural investment in Yemen faces a multitude of challenges. Limited access to affordable financing, coupled with high interest rates and collateral requirements, deters potential investors. Poor infrastructure, including inadequate road networks and limited access to electricity, increases operational costs and hinders efficient transportation of goods. An unfavourable regulatory environment and lack of government support further discourage investment. High tariffs on imports of agricultural equipment and inputs, along with limited export services, create additional hurdles for investors looking to enter the market. Socio-economic barriers, such as low financial literacy, cultural perceptions of agriculture as an unprofitable venture and complex land ownership issues, also contribute to the problem. These challenges collectively create a hostile environment for agricultural investment, hindering the sector's growth and potential.

Strategies to attract and actively engage investors and private sector stakeholders are depending on strengthened rule of law with effective implementation of the legal framework, and with a focus on the protection of investors' rights. Improving infrastructure such as roads, ports and electricity in order to facilitate logistical operations is also critical for attracting investment.

The regulatory environment includes both barriers and incentives for private sector participation. The Investment Law of 2010 provides several incentives for agricultural investment, including customs exemptions on fixed assets, imports for investment projects and production inputs. The Income Tax Law of 2010 offers tax reduction incentives for agricultural investment projects. Challenges accessing these incentives include lack of awareness among agricultural investors of such incentives and lack of awareness at customs offices at ports of entry for agricultural assets, as well as administrative corruption and poor law enforcement limiting the impact of attracting investors. The Water Law of 2002 governs the management and protection of water resources, which are considered common property in Yemen. The law prioritizes water use for drinking and domestic purposes, followed by livestock watering, public utilities, irrigation and industrial purposes. The law emphasizes sustainable management of water resources in irrigation.

Social and economic impacts on local communities need to be considered when encouraging private sector participation in agricultural revitalization. New actors into the valley need to satisfy various local stakeholders. Farm labourers and tenants need to maintain their livelihoods. Local landowners are interested in expanding agricultural activities, but do not want conflicts with their current labourers and tenants. Farmers are open to leasing out their land or partnering with investors through various arrangements like profit-sharing, rent-based leasing and capital injections. They are keen to have an income in any new structure and would like to establish clear arrangements for managing profits and losses in such partnerships, ensuring fair allocation of costs and benefits.

Water management is the most significant challenge faced by farmers, followed closely by financial constraints. Measures to achieve sustainable development and mitigate environmental impacts need to focus on water management. Approximately 70 percent of farmers interviewed claim to face water shortages. At the other extreme, there are damages from flooding and excessive rains, with flash floods destroying vital infrastructure such as canals, wells and gabions. Farmers' proposed solutions include drilling or improving wells, maintaining or expanding irrigation canals, building and repairing dams and water barriers, and adopting modern, water-saving irrigation techniques. The Wadi Hajr Watershed Development Project should support resolving water management problems.

The private sector's need for an attractive economic return and value addition has to strike a balance, ensuring that activities are conducted in a responsible and sustainable manner that considers both environmental and social impacts. Most farmers propose drilling or improving wells as a solution to current water shortages. In other words, they are more inclined to increase water supply than going for responsible stewardship of scarce water resources. Only 11 percent of interviewed farmers are aware of modern irrigation methods such as drip and sprinkler/spray irrigation, and only 3 percent actually use these methods. The gap between awareness and implementation signals a need for targeted training and financial support. Only 23 percent of the farmers are members of water associations. The Wadi-Hajr Watershed Development Project is supporting Water Users' Associations and could also support agricultural cooperatives to engage in improved production and organize farmers to engage with the private sector in prudent water use.

Given that family farms dominate Yemeni agriculture, strategies that empower smallholders through training, access to credit and access to agricultural extension services are crucial for improved productivity and efficiency. Establishing specialized cooperative associations could boost market opportunities.

The study gives recommendations for partnership development. There is significant potential in public-private partnerships to overcome challenges such as fragmented land holdings, limited access to finance and weak infrastructure. Public-private partnerships can be implemented through contracts with small landholders or by establishing joint-stock companies, regulated by the Yemeni Companies Law. There is also significant potential in contract farming and cooperative models to overcome these challenges. The development of supporting industries (packaging, cold storage, agricultural inputs) is also crucial for maximizing the value of agricultural production.

The study has identified innovative techniques and methods to enhance the effectiveness of the Hadhramaut Valley Watershed Development Project in collaboration with farmers' cooperatives and water user associations. The following ideas for unique and innovative ideas to be encouraged in the Wadi Hajr Development Project could be supported and encouraged by the public sector in partnership with the private sector:

" Contract farming program for wheat: Launch a governorate-sponsored contract farming program for wheat, guaranteeing prices and covering input costs for farmers who commit supplying to major importers/millers. This reduces import dependence and ensures a market for local production.

" Hadramout brand" for premium dates: Develop a regional branding and certification program for high-quality dates, enabling premium pricing and export opportunities. This could involve quality control, packaging standards and marketing support.

" Mobile veterinary clinics: Support private veterinary practices to operate mobile clinics, reaching remote areas and providing essential animal health services. This addresses a critical gap in livestock care.

" Drought-resistant forage seed subsidies: Subsidize the cost of drought-resistant forage seeds for livestock farmers, encouraging the adoption of climate-smart practices and reducing reliance on imported feed.

" Agri-tourism initiatives: Promote agri-tourism by supporting farms that offer visitor experiences (e.g., date palm tours, honey tasting, farm stays).

" Solar-powered cold storage grants: Provide grants for farmers to install solar-powered cold storage units, reducing post-harvest losses and enabling better market access.

" Innovation vouchers" for agri-tech: Offer innovation vouchers to farmers who adopt new technologies (e.g., precision irrigation, green tech).

" Land tenure security program: Implement a program to clarify and secure land tenure rights, reducing investment risks and encouraging long-term agricultural development.

" Diaspora bonds" for agriculture: Issue diaspora bonds specifically targeted at agricultural investment in Wadi Hajr, tapping into the financial resources and expertise of the Hadrami diaspora.

The study proposes modalities to facilitate private sector collaboration with and support for local communities. Public-private partnerships are increasingly used to mobilize private investment towards collective goals in agriculture. Contractual partnerships can enhance food security by connecting small landholders with the private sector. These partnerships can be implemented through contracts with small landholders or by establishing joint-stock companies, regulated by the Yemeni Companies Law.

The study proposes improving the level of women's participation in agricultural work by increasing their capacities and knowledge. Insurance and credit schemes (either formal or informal) are fundamental components for any intervention aiming at enhancing rural women's economic empowerment. Interventions that work through women's groups are more beneficial to poor rural women with limited mobility and low level of education. However, there is also a need to address the system of property rights that favours men – with resulting difficulties faced by women in accumulating productive assets that they can control – so that women can build up control of such assets for the production they are engaged in. However, it is beyond the scope of an agricultural project to accomplish a transformational change of social norms and gender related restrictions at community level in a patriarchal dominated society such as the one in Yemen. Individual projects can at best expect to be able to achieve women's empowerment at an individual level.

The private sector needs to be encouraged to collaborate with local authorities to develop a comprehensive agricultural strategy, which can generate significant economic returns for the region, at the same time as environmental sustainability is ensured. The private sector's role in this should focus on investment in infrastructure, including irrigation systems and storage facilities, and technology to increase agricultural productivity and reduce post-harvest loss. The private sector should also support the establishment of cooperative associations and participate in public works programs aimed at constructing small dams and rainwater harvesting structures.

The study presents an investment blueprint with a synergistic approach, focusing on an Integrated Agricultural Development Zone combining crop (1,500 ha for dates, wheat, onions, vegetables, fodder) and livestock production (breeding and fattening). This model aims to enhance food security, achieve economic efficiency and create local employment, a model that can be replicated.

Conclusion:

Wadi Hajr has the resources and community will to become a model for sustainable agricultural development in Yemen. Realizing this potential will require coordinated action from government, the private sector, local farmers and international partners to overcome persistent barriers, leverage local strengths, and harness promising opportunities.

BACKGROUND AND RATIONALE OF THE STUDY

The Wadi-Hajr watershed in Yemen is a vital region for agriculture and water resource management, playing a significant role in supporting the livelihoods of local communities. The ongoing Wadi-Hajr Watershed Development Project aims to establish sustainable, resilient, and equitable management of water and agricultural resources in the region. A key focus of the initiative is to enhance agricultural productivity, particularly in cereal cultivation (with an emphasis on wheat), by introducing advanced irrigation technologies and improved water management practices.

While environmental and technical advancements are critical to the project's success, its long-term sustainability depends heavily on active and robust private sector engagement. The private sector is expected to play a pivotal role in driving investments, fostering innovation, and facilitating market development. This engagement is essential to achieving the project's overarching objectives of sustainable agriculture, economic growth, and social equity within the Wadi-Hajr region.

The study aims to understand possibilities of developing the region within the limits of available natural resources and human resources with the following sub-objectives:

1 How can the project maximize economic return and value addition per unit of water while ensuring that private sector activities are conducted in a responsible and sustainable manner, considering environmental and social impacts?

2 How can the project plan be developed considering the needs and interests of potential private sector investors?

3 Analyse and evaluate the potential synergies and conflicts between private sector investment goals (profitability, efficiency) and public sector priorities (social equity, environmental sustainability) within the Wadi Hajr watershed development project.

4 What modalities can be established to facilitate private sector collaboration with and support for local communities? How can the project leverage the private sector to benefit the communities in the area?

5 How can an enabling environment be created to encourage investments and private sector activity in agriculture projects in the area, while addressing challenges such as regulations, land rights, guarantees for investors, environmental risks assessment, community relations, and risk mitigation?

6 What are the potential areas for private sector investment in agriculture development within the watershed? This involves identifying specific opportunities and sectors with growth potential.

7 Improving the level of women's participation in agricultural work and increasing their capacities and knowledge.

Objectives and Scope of the Study

The main objective of this study is to identify strategies to create an enabling environment for private sector investment and participation in the Wadi Hajr and the watershed development project. The main objectives are:

- Understand the private sector's perspective on agricultural investments in the region and the barriers that limit their participation.
- Assess the regulatory environment and identify any barriers or incentives for private sector participation.
- Propose measures to achieve sustainable development and mitigate the environmental impact.
- Identify potential investment opportunities for the private sector within the Hadhramaut Valley Watershed Development Project.
- Proposing incentive mechanisms to encourage private sector participation, add value and develop the value chain.
- Consider the social and economic impacts on local communities.
- Develop strategies to attract and actively engage investors and private sector stakeholders.
- Provide recommendations for capacity building and partnership development.
- Identify innovative techniques and methods to enhance the effectiveness of the project in collaboration with farmers' cooperatives and water user associations.

Description of Methodology

The study employed a comprehensive methodology, integrating both qualitative and quantitative data collection techniques. Data was gathered through a desk review of materials provided by the Food and Agriculture Organization (FAO), focus group discussions, and key informant interviews with a diverse range of stakeholders. These stakeholders included local communities, government authorities, private sector actors, business organizations, farmers, and landowners.

The project reviewed previous studies conducted by FAO and other research institutions, engaging directly with over 320 farmers, and over twenty community members in the Wadi-Hajr region. Discussions were also held with value chain actors from both the agricultural and non-agricultural sectors.

The analysis incorporated an assessment of the regulatory environment and drew comparisons with case studies, particularly focusing on large-scale wheat agriculture projects. A market analysis was conducted to identify business opportunities and potential interventions aimed at enhancing food security, livelihood opportunities, and overall development in the Wadi-Hajr region.

The study utilized data from multiple sources, including the Central Bureau of Statistics at the Ministry of Planning and International Cooperation, the General Directorate of Agricultural Statistics at the Ministry of Agriculture and Irrigation, and the General Authority for Agricultural Research. Additional data was obtained from the offices of agriculture and irrigation in the targeted governorates, as well as from local and international communication networks, such as the Ministry of Planning and International Cooperation's website, FAO resources, and other relevant research and studies. Historical studies on Wadi-Hajr were also reviewed to provide context and inform the analysis.

Primary data collection involved direct engagement with 320 farmers, consultations with ten value chain actors, and interviews with ten landowners, who in turn referenced five agricultural associations. FAO facilitated communication with local authorities and research institutions, sharing relevant studies that contributed to the findings. Furthermore, outreach was conducted with over thirty potential business organizations to assess their interest in and concerns about participating in the project.

Study limitation included limited access to key stakeholders such as mega investors or Yemen's largest private sector actors. Many landowners were unavailable for direct engagement due to being outside the country, far from the Wadi, or happened to be unavailable, often delegating to proxies or representatives. Many private sector actors from Hadhramaut also reside outside the country, limiting direct input.

The study relied on stakeholders stated future intentions, which may not reflect actual behaviour or account for unforeseen risks. Efforts were made to validate these intentions by highlighting potential benefits and concerns for feedback. In addition, the study focused on fertile areas identified in previous research, which may have excluded other emerging opportunities.

YEMEN CONTEXT

Agricultural investment in Yemen faces a multitude of challenges. Limited access to affordable financing, coupled with high interest rates and collateral requirements, deters potential investors. Poor infrastructure, including inadequate road networks and limited access to electricity, increases operational costs and hinders efficient transportation of goods. An unfavourable regulatory environment and a perceived lack of government support further discourage investment. Socio-economic barriers, such as low financial literacy, cultural perceptions of agriculture as an unprofitable venture, and complex land ownership issues, also contribute to the problem. These challenges collectively create a hostile environment for agricultural investment, hindering the sector's growth and potential.

Economic Importance of Agriculture

15%	+50%	15-20%
Contribution to GDP	Workforce Employed	Staple Food Needs Met

Agriculture contributes about 15% to Yemen's GDP and employs over half the workforce, making it essential for rural livelihoods and non-oil exports . However, the sector struggles with water scarcity, limited arable land, and conflict, resulting in Yemen producing only 15–20% of its staple food needs and relying heavily on imports, especially wheat. Key crops include sorghum, mangos, qat, onions, tomatoes, wheat, and various fruits, with exports such as bananas, mangos, and dates.

Current Agricultural Landscape in Yemen

Yemen's agriculture sector employs over half of the workforce and is serving as the main source of income for a significant portion of the population. The sector is characterized by:

Diverse Agro-Ecological Zones

Yemen's geography includes desert areas, lowlands, and highlands each with distinct agricultural practices. The highlands are known for terraced agriculture, while the lowlands focus on irrigated horticulture and field crops.

Limited Water Resources

Yemen is one of the most water-scarce countries globally, with agriculture consuming about **90%** of available water resources. This scarcity is exacerbated by climate change, which threatens water availability and agricultural yields.

Dependence on Imports

Approximately **80%** of Yemen's food is imported, with local production accounting for only **20%** of food availability. This reliance on imports highlights the potential for increasing domestic production to enhance food security.

Challenges Facing Agricultural Investment

Conflict and Instability

The ongoing civil war has devastated agricultural infrastructure, leading to estimated losses of about $111 billion in the sector since the conflict began2. The war has disrupted supply chains, increased costs for inputs like fuel and fertilizers, and caused widespread displacement.

Climate Change

Yemen faces significant climate-related challenges, including erratic rainfall patterns and prolonged droughts. These factors exacerbate food insecurity and threaten agricultural productivity. Farmers are increasingly vulnerable due to outdated farming techniques and a lack of access to modern agricultural practices.

Water Scarcity

Water resources are critically limited, with renewable water availability estimated at 2.5 billion cubic metres per year, while consumption reaches about 3.5 billion cubic metres. This gap is filled by groundwater extraction, which is unsustainable for long-term agricultural expansion.

Economic Decline

The broader economic context is dire, with high inflation rates and a significant portion of the population—over 66%—in need of humanitarian assistance. This economic instability limits available capital for investment in agriculture.

Infrastructure Damage

Damage to irrigation systems, storage facilities, and transportation networks has further hindered agricultural activities.

Environmental Degradation

Soil erosion, deforestation, and overgrazing are prevalent, reducing the land's agricultural potential.

Resource Constraints

Limited access to inputs such as seeds, fertilizers, and fuel, along with a lack of veterinary services, has negatively impacted both crop and livestock production.

Opportunities for Investment

Despite these challenges, there are promising avenues for agricultural investment that could enhance productivity and resilience:

Investment in Infrastructure

There is a pressing need for improved agricultural infrastructure[3], including irrigation systems and storage facilities. Investments in these areas could significantly enhance productivity and reduce post-harvest losses[4].

High-Value Crops

Focusing on high-value crops such as dates, wheat and honey presents opportunities for export growth. Potential initiatives could aim to rehabilitate palm trees, beekeeping and boost mega farms, potentially increasing farmers' incomes substantially while tapping into premium markets. The Hadhramaut poverty alleviation and growth strategy[5] invited investments in the cultivation of unused agricultural land. There are 8,843 hectares of arable land available in Hadhramaut, suitable for growing crops like palm, sesame, onions, lemon and corn.

Export Opportunities

Surplus agricultural products such as tomatoes and dates could be exported given value-added activities such as packaging, preserving, and marketing these products, as well as creating storage facilities for surplus crops during certain seasons. In addition, the strategy suggested animal feed and livestock production through investing in the production of animal feed, and subsequently in livestock and poultry farming. This also includes beekeeping and honey production, which are important for both local consumption and export.

Family Farming Development

As family farms dominate Yemeni agriculture, strategies that empower smallholders through training, access to credit, agricultural extension services to improve productivity and efficiency, establishing specialized cooperative associations to boost economic development, and increased market opportunities could lead to significant improvements in productivity and livelihoods.

Value Chain Development

There is potential to enhance the value chain for key agricultural products, including dairy, horticulture, and honey, through improved processing, packaging, and marketing[6]. Value chain actors from the private sector could provide value and leverage opportunities.

Engaging the Private Sector

The private sector should focus on enhancing agricultural productivity through investment in infrastructure and technology[7]. It should also support the establishment of cooperative associations and participate in public works programs aimed at constructing small dams and rainwater harvesting structures. Additionally, the private sector is encouraged to collaborate with local authorities to develop a comprehensive agricultural strategy and promote agricultural exports, which can generate significant economic returns for the region. By integrating agricultural and industrial projects, the private sector can maximize efficiency and output, contributing to the sustainable development of Hadramout's agriculture sector.

Regulatory and Policy Framework

The regulatory framework for agricultural investment in Wadi Hajr, Hadhramaut Governorate, is subject to two main aspects:

Supervisory Bodies	Governing Laws
Large-scale Investments General Investment Authority oversees investments structured as companies	**Investment Law of 2010** General Investment Authority oversees investments structured as companies
Agricultural Cooperatives Supervised by local council, district, and Ministry of Social Affairs office	**Local Authority Law No. 4 of 2000** Supervised by local council, district, and Ministry of Social Affairs office

The regulatory framework for agricultural investment in Wadi Hajr, Hadhramaut Governorate, is subject to two main aspects: the supervisory bodies overseeing the investment and the governing laws, including the incentives they provide. The supervisory bodies for agricultural investment in Wadi Hajr vary based on the legal structure of the investment. For large-scale investments structured as companies, the General Investment Authority is responsible, and the investor benefits from the guarantees and incentives provided by the Investment Law of 2010 and the Income Tax Law No. 17 of 2010, respectively. For investments structured as agricultural cooperative societies or associations, the supervisory bodies include the local council, the district, and the office of the Ministry of Social Affairs, as per the Local Authority Law No. 4 of 2000.

Legal Incentives and Exemptions

The Investment Law of 2010 provides several incentives for agricultural investment, including customs exemptions on fixed assets, imports for investment projects, and production inputs. The Income Tax Law No. 17 of 2010 offers tax incentives for agricultural investment projects, with a reduced tax rate of 15% instead of 20% for projects with a capital of at least $3 million and 100 labour. The Cooperative Societies and Unions Law No. 39 of 1998 grants several exemptions for agricultural cooperative societies, including exemption from commercial and industrial profit taxes, customs duties on imports, and provision of financial support and loans. As suggested by the agriculture office, this could be encouraged to organize farmers, landowners and community members to organize and deal with the private sector.

Challenges accessing these incentives include lack of awareness among agricultural investors of such incentives, and lack of awareness at customs' authority offices at ports of entry of agricultural assets lists.

Types of Agricultural Cooperatives

According to the Cooperative Societies and Unions Law No. 39 of 1998, two main types of agricultural cooperatives can be formed:

Multi-purpose agricultural cooperative: Provides services to its members, such as supplying machinery and equipment or marketing their products.

Specialized agricultural cooperative: Specializes in agricultural production or livestock production.

The Wadi-Hajr Watershed Development Project is supporting Water Users Associations and could also support agricultural cooperatives to engage in improved production and organize farmers to engage with the private sector.

Private Sector Participation

Public-private partnerships are increasingly used to mobilize private investment towards collective goals in agriculture. Contractual partnerships can enhance food security by connecting small landholders with the private sector. These partnerships can be implemented through contracts with small landholders or by establishing joint-stock companies, regulated by the Yemeni Companies Law No. 22 of 1997.

Other Relevant regulations

Yemen has enacted laws to support agricultural cooperatives and water management, providing a framework for community involvement and sustainable resource use. Yemen is a party to several international environmental agreements, which can facilitate access to global support and funding for sustainable agricultural projects.

Environmental Protection Law (EPL) No. 26 of 1995:

This law provides the overarching framework for environmental protection in Yemen, including the agricultural sector. It mandates the integration of environmental considerations into development plans and requires Environmental Impact Assessments (EIAs) for projects with potential environmental impacts.

Pesticides Law No. 25 of 1999:

This law regulates the handling, registration, and inspection of pesticides to minimize their harmful effects on human health, animals, and the environment. It is enforced by the General Directorate of Plant Protection (GDPP) in coordination with the Environmental Protection Authority (EPA).

Water Law No. 33 of 2002:

This law governs the management and protection of water resources in Yemen, which are considered common property. It prioritizes water use for drinking and domestic purposes, followed by livestock watering, public utilities, irrigation, and industrial purposes. The law also emphasizes the sustainable management of water resources in the irrigation sector and delegates this responsibility to the Ministry of Agriculture and Irrigation (MAI).

Policy Framework

National Agriculture Sector Strategy (NASS) 2012-2016:

This strategy aims to increase agricultural output, raise rural incomes, and preserve the environment. It emphasizes a demand-driven and participatory approach, decentralization, and increased reliance on the private sector.

National Water Sector Strategy and Investment Program (NWSSIP) 2009-2015:

This strategy seeks to integrate water policies and promote sustainable growth and poverty reduction. It aims to ensure coordination among partners in the water supply and sanitation sub-sectors and ascertain equitable allocation of investments.

SITUATIONAL ANALYSIS: WADI HAJR DEEP DIVE

Wadi Hajr is a significant agricultural valley in Yemen, known for its fertile lands and consistent water flow. The valley stretches approximately 150 km in length, with a basin area of about 9,160 square kilometres. The valley floor sits at an elevation of around 473 meters above sea level. The area receives an average annual rainfall of about 80 mm, resulting in approximately 340 million cubic meters of runoff water annually, which is crucial for irrigation. The arable land amounts to about 6500 hectares, representing about 1% of the total geographical area. This land is distributed across the Lower and Upper Hajar areas. The cultivated area has dropped from 3,625 hectares in 2001 to about 1,059 hectares in 2008 due to economic hardships and lack of interest in agriculture.

150 km	9,160 km²	473 m	80 mm	340M m³	6,500 ha
Valley length	Basin area	Elevation	Annual rainfall	Annual runoff	Arable land

Land Tenure System and Investment Mechanisms

Wadi Hajr is characterized by small land holdings, which are predominantly privately owned, with a small percentage owned by the state. Land ownership is primarily established through customary and documented means, with customary norms acting as the primary reference. Land holdings in Wadi Hajr are categorized into three types: owned land, rented land, and shared land, each with its own method of organization and management.

Owned lands are those lands that farmers own as their private property. Shared lands are those cultivated in partnership, where the landowner provides the land and shares in covering some expenses with the farmer. As a result, the landowner receives a share of the production that is higher than the standard land rent practiced in the area. As for rented lands, they are leased from landowners in exchange for 10% of the production or through fixed cash payments, regardless of whether the land is cultivated once a year, multiple times, or not cultivated at all.

> ***Proposed Solutions for Small Land Holdings:*** *The fragmented nature of agricultural production and small land holdings in Yemen poses challenges for investment. However, small land holdings can be profitable if appropriately invested in high-value crops, product processing, or service provision to other farmers. The World Bank's participatory approach, involving the creation of associations or groups, is suggested to facilitate community-level investment and management of small land holdings.*

The valley possesses natural resources to support agriculture, with proper irrigation systems, improved seeds, and equipment, return on agriculture could be valuable.

Dominant Agricultural Products and High-Potential Value Chains

Highest Yielding Crops
- **Watermelon:** 6.97 tons/faddan
- **Banana:** 7.00 tons/faddan
- **Tomato:** 7.85 tons/faddan

Highest Price Margins
- **Sesame:** 1,282 → 4,000 YER/kg
- **Lemon:** 359 → 4,000 YER/kg
- **Wheat:** 1,554 → 3,000 YER/kg

Seasons Potential
- **Banana:** 8.75 current vs 1.53 potential
- **Sesame:** 1.22 current vs 3 potential
- **Lemon:** 3.24 current vs 1.02 potential

Value Chain Potential
- **Sesame:** High margin + seasons potential
- **Banana:** High yield + moderate margin
- **Tomato:** High yield + multiple seasons

A variety of crops are grown. The table below includes top crops with their current yields and prices

High Yield · High Price Margin · High Seasons Potential

	Avg Seasons	Potential Seasons	Avg Faddan	Avg Tons/Faddan	Farm Gate (YER/Kg)	Retail Price (YER/Kg)
Tomato	1.08	2.00	1.13	7.85	868	1,500
Watermelon	1.77	2.00	5.05	6.97	309	700
Banana	8.75	1.53	7.00	7.00	363	1,500
Sesame	1.22	3.00	1.94	0.68	1,282	4,000
Lemon	3.24	1.02	1.10	359	359	4,000
Wheat	1.20	1.32	0.63	1,554	1,554	3,000
Corn	1.52	2.00	1.32	0.73	1,579	2,000
Date Palm	1.01	2.27	2.37	796	796	3,000
Papaya	2.51	1.01	1.14	323	323	2,000
Mango	1.00	1.00	0.96	561	561	2,500
Hot Pepper	1.00	0.95	0.38	488	488	2,000
Eggplant	1.00	1.44	3.00	350	350	1,000
Millet	1.11	2.00	1.04	0.44	1,819	2,500
Onion	1.02	2.00	1.14	3.13	1,096	1,500

Most Promising Value Chains

Based on combined metrics of yield, price margin, and seasons potential.

Sesame
Highest price margin (2,718 YER/kg) with significant seasons potential (146% increase)

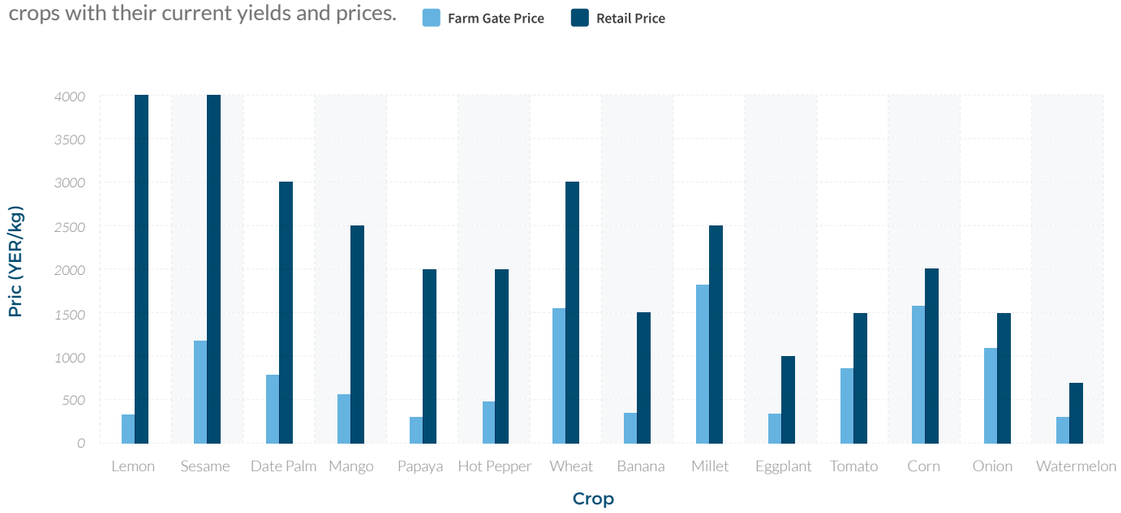
Tomato
Highest yield (7.85 tons/faddan) with good seasons potential (85% increase)

Watermelon
High yield (6.97 tons/faddan) with moderate seasons potential (13% increase)

* Study findings in December 2024, 1 USD = 2050 YER.

Price Comparison: Farm Gate vs Retail (YER/Kg)

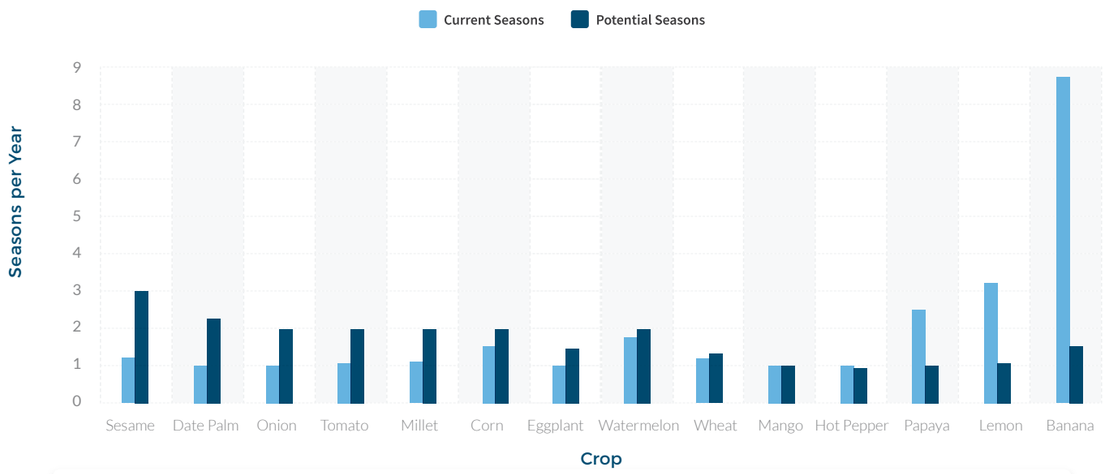
A variety of crops are grown. The table below includes top crops with their current yields and prices.



Key Findings

Sesame (1,282 → 4,000 YER/kg), **Lemon** (359 → 4,000 YER/kg), and **Wheat** (1,554 → 3,000 YER/kg) show the highest price margins, indicating strong profit potential in the value chain.

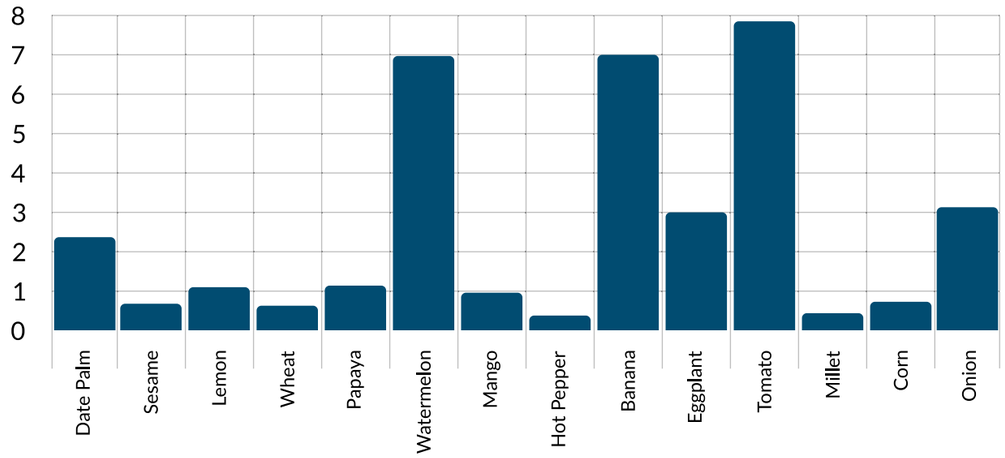
Seasons Potential: Current vs Potential per Year



Key Findings

Sesame (1.22 → 3), **Corn** (1.52 → 2), and **Tomato** (1.08 → 2) show the most significant potential for increased seasons, indicating opportunity for substantially higher annual output through more frequent harvesting.

CROP YIELD COMPARISONAND AVERAGE TONS PER FEDDAN BY CROP



Key Findings

Tomato (7.85 tons/faddan), **Watermelon** (6.97 tons/faddan), and **Banana** (7.00 tons/faddan) are the highest yielding crops, showing strong productivity potential.

Other high potential produce includes banana, corn, onion, sorghum, lemon, mango, alfalfa, papaya, wheat, radish, pepper, yellow corn, eggplant, cucumber and okra, listed in the order of their value. In addition, there are Ceder trees, important for production of high-quality honey. Livestock are also reared in the valley.

The crop composition in the Hajar district includes most of these crops. Fruit crops (date palm, mango, lemon, banana, papaya, guava) come in first place, with an agricultural area of about 1,583 hectares, representing half of the total cultivated area. Cereals (sorghum, millet, maize, wheat, barley) come in second place with an agricultural area of about 980 hectares, representing about 31% of total crop area, followed by fodder such as corn and alfalfa, with an agricultural area of about 341 hectares, representing about 11% of cropped area. Vegetables (tomatoes, watermelons, onions, radish, hot pepper, eggplant, okra, cucumber, melon) cover on agricultural area of about 126.7 hectares, representing about 4% of total crop area (source: Agricultural Census 2002).

Wadi Hajr has suitable climatic and geographical conditions for palm cultivation and date production. The date palm ranks first in fruit crops in terms of area. The average productivity is about 31 kg per palm. This rate is very low compared to countries such as Saudi Arabia and Namibia, where the rate is up to 120 kg per palm. Several factors influence such low productivity. Farmers frequently lack the expertise needed for proper palm care. Agricultural extension services, which provide training and guidance, are often unavailable or insufficient. Many palm groves are old and past their prime productivity, making them less profitable. Neglecting essential practices like trimming and pruning dead and damaged fronds, fertilization and pest/disease control weakens the trees.

POTENTIAL AGRICULTURAL ACTIVITIES & FUTURE OPPORTUNITIES

The following table includes potential agricultural activities in Wadi Hajr, Hadramout, Yemen, along with an analysis of their potential and future opportunities:

Crop/Opportunity
Dates

Potential & Rationale
Wadi Hajr has unique seasonal advantages; underexploited high-value crop.

Future Opportunities & Analysis
Model orchards, improved varieties, packaging, processing (date syrup, paste), and export potential.import reliance.

Crop/Opportunity
Vegetables, tomatoes, cucumbers, peppers

Potential & Rationale
High demand; protected and hydroponic agriculture can multiply yields.

Future Opportunities & Analysis
Greenhouse and hydroponic farming, off-season production, supply to urban markets, and export.

Crop/Opportunity
Mango, banana

Potential & Rationale
High-quality varieties possible; market not saturated; suitable climate.

Future Opportunities & Analysis
Automated orchards, post-harvest handling, cold storage, and juice/concentrate production for local and export markets.

Crop/Opportunity
Sesame, sunflower

Potential & Rationale
Oilseed crops with local and export demand; suitable for local climate.

Future Opportunities & Analysis
Expansion of oil extraction industries, value-added products, and export.

Crop/Opportunity
Honey production

Potential & Rationale
Traditional activity; high-value product; export potential.

Future Opportunities & Analysis
Modern beekeeping, branding, packaging, and export to Gulf and international markets.

Crop/Opportunity
Agro-processing

Potential & Rationale
Value addition to crops (juices, jams, pickles, flour blends).

Future Opportunities & Analysis
Investment in food processing, packaging, and cold chain logistics for local and export markets.

Crop/Opportunity
Wheat

Potential & Rationale
Strategic for food security; high import bill; local demand is strong.

Future Opportunities & Analysis
Contract farming, investment in irrigation and mechanization, value chain development, and reducing import reliance.

Crop/Opportunity
Diversification of food products, local processing industries, and reducing pressure on wheat imports.

Potential & Rationale
Adapted to local climate; staple foods; can be blended with wheat for composite flour.

Future Opportunities & Analysis
Diversification of food products, local processing industries, and reducing pressure on wheat imports.

Crop/Opportunity
Fodder crops

Potential & Rationale
Essential for livestock sector; local production reduces feed costs.

Future Opportunities & Analysis
Drought- and salinity-resistant varieties, integrated livestock-feed projects, and export of surplus fodder.

Crop/Opportunity
Citrus, onion

Potential & Rationale
Suitable soils and climate; local and regional demand.

Future Opportunities & Analysis
Export-oriented production, processing (juices, dried onion), and supply chain development.

Crop/Opportunity
Livestock

Potential & Rationale
Large local market; potential for fattening, dairy, and poultry.

Future Opportunities & Analysis
Breed improvement, feedlot operations, dairy processing, and poultry farms.

The private sector can play a transformative role by investing in modern technologies (irrigation, greenhouses, mechanization), value chain integration (from production to processing and marketing) and export-oriented agribusiness. There is also significant potential in contract farming, cooperative models, and public-private partnerships to overcome challenges such as fragmented land holdings, limited access to finance, and weak infrastructure. The development of supporting industries (packaging, cold storage, agricultural inputs) is also crucial for maximizing the value of agricultural production.

A baseline study was conducted by ACACIA for FAO. The study found that there is no effective value-chain for wheat. There are no storage facilities, no labour available for processing, low level of mechanisation, little faith in government. None of the farmers covered by that study cultivated wheat. Only a minority of farmers acknowledged that wheat has a high market value. The reports suggested a comprehensive approach that focuses not only on bringing wheat seeds and modern irrigation systems, but also considers aspects of training, finance and investment.

According to the study, “wheat cultivation suitability is classified somewhere between low to medium with only a few patches being classified as high potential. The latter are regions in the flood plains, and which are likely cultivated with a different crop because the water is available compared to other parts of the region. However, one should note that these flood plains may already be cultivated, and that water may only be abundant in the form of flash floods.” For the sake of this project initiative, private sector engagement would need to identify floodplain, invest in water harvesting and efficient irrigation, provide support services such as training, finance, establishing cooperatives, and address land ownership.

The value chain includes farmers who lack access to finance and sufficient water supply. Main suppliers of seeds are farmer associations. Given the intervention, big opportunity exists for the private sector to operate as suppliers of modern irrigation and farming supplies. There is no mechanization, storage facilities, processing services and low level of awareness of extension services. According to the survey conducted, 88% of the farmers had less than 5 fadans (2.1 ha) indicating fragmentation and the need of a coordination mechanism for justified investment in wheat production.

The study concluded that wheat cultivation can be promoted by conversion to wheat of new agricultural areas. Water management is key. Surface water availability in the headwater catchments may be limited, but will be of better quality than downstream areas. Groundwater potential is relatively high in the upstream areas, which would also have better temperature and past experience of wheat cultivation. The lower catchment in Mayfa could find large plots per farm and leverage livestock.

Wheat production challenges include difficulty in marketing wheat as it competes with cheaper lower quality imported wheat. Other challdenges are high investment requirements, the lack of timely availability of labour, high costs of pesticides and fertilizers, prevalence of rust diseases, infestation by aphids, high prices of wheat seeds and poor quality of certified wheat seeds distributed by the Seed Multiplication Corporation, which are often mixed and unclean.

In the sample of farmers surveyed under this report, 91% expressed interest in or already grow wheat, but face significant barriers as shown in **Figure 1**. Access to water and irrigation is the most pressing concern (70%), followed by challenges related to seeds and inputs (60%). Many farmers also lack adequate Machinery & Equipment (40%), and there is a need for greater Knowledge & Extension services (30%). Pests & Diseases pose a significant threat (25%), while Financial Constraints limit 20% of farmers. Land Availability is a concern for 10%, and a variety of other factors impact the remaining 15%. Some farmers also cited scarce labour or difficulty in finding workers. However, a small percentage stated that with sufficient resources, knowledge and tools, wheat farming posed no significant challenges.

WHEAT PRODUCTION ANALYSIS

Value chain, challenges, and farmer survey results

Value Chain Analysis

- **No effective value chain** for wheat in Wadi Hajr
- **No storage facilities** for harvested wheat
- **No labor available** for processing activities
- **Low level of mechanization** in wheat production
- **Little faith in government** support and services

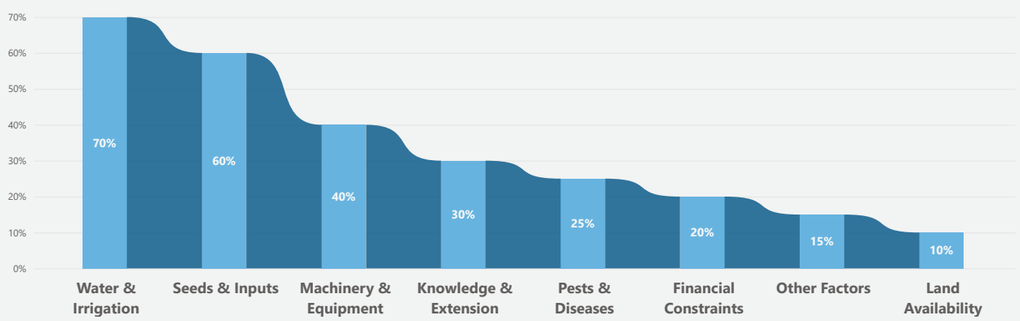
None of the farmers covered by the study cultivated wheat, and only a minority acknowledged wheat's high market value

Challenges in Wheat Cultivation

- **Marketing difficulty** due to competition with cheaper imported wheat
- **High investment requirements** for wheat production
- **Lack of timely labor** availability for farming activities
- **High costs** of pesticides and fertilizers
- **Rust diseases** and **aphid infestation** affecting crops
- **High prices** of wheat seeds and **poor quality** of certified seeds

Farmer Survey Results: Barriers to Wheat Production

Figure 1



91% of farmers expressed interest in or already grow wheat, but face significant barriers as shown in the chart above

CRITICAL BOTTLENECK: WATER RESOURCE

ACCESS AND MANAGEMENT

Findings of the farmer survey under this study reveal high dependence on rainwater in the valley, with 90.6% of farmers flooding their produce with running water. Only 2.3% have deep wells to irrigate crops, and 99% flood their crops with water without any irrigation system. Farmers fear water challenges for several reasons. 64% of them depend on their agriculture for food, and cannot afford investments in well digging, channel rehabilitation and water pumping. At the same time, floods damage canals and mismanagement results in limited access to water. This study asked farmers if they believe that there is sufficient availability of water. 36% believe there is, and their suggestions to tackle this issue included digging wells (60%), solar pumping (40%), irrigation system maintenance and expansions (25%), and water storage (20%). Only around 10% suggested modern efficient irrigation systems. Only 12% indicated they know about efficient irrigation methods. Just 4% receive extension services from the agriculture office. Performance against these indicators is expected to improve with the Wadi Hajr Watershed Project and FAO activities in the region. This intervention is expected to support canal rehabilitation, introduce improved water irrigation techniques, and provide support to water users' associations.

Water Sources and sufficiency

Farmers rely on a range of water sources, including wells (shallow, deep or open), rainfall, seasonal floods and springs. Flood irrigation (traditional) is overwhelmingly common, used by 99% of farmers.

Water management is the most pressing challenge, with approximately 70% of farmers claimed to face water shortages. This is compounded by damages from flooding and rain, affecting around 55% of farmers, with flash floods destroying vital infrastructure like canals, wells, and gabions. Farmers proposed solutions included: drilling or improving wells (68%), maintaining or expanding irrigation canals (29%), building or repairing dams/water barriers (17%), and adopting modern, water-saving irrigation techniques (16%). The Watershed intervention would support resolving these problems.

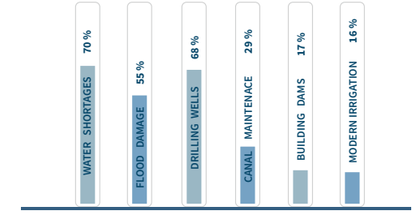
Knowledge and Use of Water-Saving Techniques:

only 11% are aware of modern irrigation methods such as drip and sprinkler/spray irrigation. However, actual usage is only 3%. This gap between awareness and implementation signals a need for targeted training and financial support. Only 23% are members of a water association.

Sources of Energy:

5% of farmers have public grid electricity, 5% have solar panels, 40% have generators and 40% have no source of electricity.

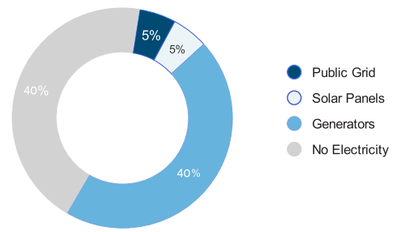
Water Challenges & Solutions



70% face water shortages, **55%** affected by flood damage

Proposed solutions: **drilling wells (68%)**, canal maintenance (29%), dams (17%)

Energy Sources



40% use generators, **40%** have no electricity source

Only **5%** use solar panels despite high solar potential

Human Capital Assessment

Demographics, Skills, and Local Aspiration

The majority of Wadi Hajr residents work with agriculture and livestock. The total number of agricultural holders is about 2,559 holdings, about 1,822 owners of land and livestock, and about 713 owners of livestock only (Agricultural Census Data 2002).

The study findings reflect a predominantly male-driven agricultural sector but also highlights an emerging albeit still very small segment of female participation (2%). Around 44% of the surveyed farmers are older than 50 years, while the remaining percentages fall within the 20–50 age bracket, with very few farmers under twenty. There is a pressing need to engage younger generations to ensure the long-term viability of future agricultural landscape. Average household size stands at 13.5 members. Larger household sizes often increase on-farm labour availability but also increase consumption needs. Average farming experience is 21 years. Such extensive practical knowledge can be a significant asset, provided farmers receive support to modernize and adopt more efficient practices.

The majority of farms operate within three main districts—Hajr, Yabout, and Mifaa—encompassing numerous villages such as Alsharuj, AlSadarah, and Al Mudheifeer. Around half of farmers interviewed own their farm land, and the other half lease or sublease farm land. Average farm size is 3.6 feddans (1.5 hectare).

64% of farmers believe their land can be expanded by an average of 4.2 feddans, whereas 36% see no possibility of expansion.

The primary reasons cited for not expanding include insufficient nearby land (73%), financial constraints (11%) and capacity constraints (8%); other reasons include water constraints, land ownership and low return.

Farmers' future goals

The study attempted to understand farmers perceptions of expanding their agricultural activities and future goals as shown in **Figure 3**.
Farmers' long-term goals focus primarily on expanding farmland and improving their overall capacity to produce crops. Many hope to introduce new or higher-value varieties as quoted "To have an ideal farm with all types of products", while also emphasizing the role of modern irrigation techniques and the need for strengthened infrastructure—such as well-drilling and land protection measures—to secure water resources and safeguard against external risks. A considerable portion aim to increase production quantity, with some underlining self-sufficiency as a key objective, lessening their reliance on external sources. Generating a stable income and improving the daily livelihood of their families remain recurring priorities. Additionally, many farmers aspire to develop high-quality model farms that employ efficient methods and produce goods suitable for export or broader market opportunities. A small minority indicate that they do not currently have specific long-term goals.
These findings support the engagement of the private sector into the area and was supported by interviews with landowners who had positive views of what the private sector can do.

Obstacles to Expansion

The study asked farmers what is keeping them from expanding their farms. Figure shows percentages of farmers' responses. Water management is the most significant challenge faced by farmers, affecting approximately 70%, followed closely by financial constraints (65%). Access to equipment and inputs is also a major hurdle to expand lands as quoted by farmers, with 50% citing lack of access or high costs. Quotes: "Equipment is needed to remove Saisaban trees!", "high cost of machines", "absence of agricultural tools." Insufficient land is a concern for 40%, while 30% face infrastructure and marketing challenges. The wadi does not have paved roads or sustainable sources of energy, and the valley is considered to be too remote for many private sector actors outside the area. Fear of debt prevents 25% from pursuing certain opportunities, and 20% identify knowledge and extension gaps as hindering their progress. Natural disasters like floods impact 10%, and another 10% struggle with labour shortages.

The study asked farmers if they are willing to borrow to expand their agricultural production. About 33% of respondents are open to investing on their own or taking loans, while 67% hesitate due to factors like inability to repay, low returns, or existing debt. The primary reasons for declining external financing include inability to repay (44%), lack of capital (16%), and difficult living conditions (16%). In terms of support needs, financial supportranks highest (about 70% of farmers), followed by water and irrigation (60%), agricultural inputs (50%), and equipment or machinery (50%). Other needs include infrastructure, marketing, roads, and licenses (23%), labour (13%), and technical assistance or training (10%).

64% Household Consumption

14% Local Retailers

84% Direct to Consumers

36% Produce Sold

Demographics & Skills

2,559 Agricultural Holdings

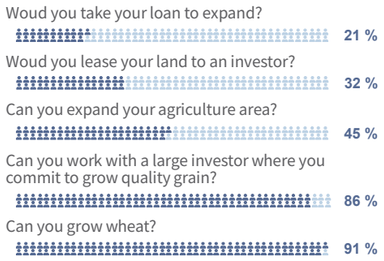
1,822 Land & Livestock Owners

713 Livestock Only Owners

21 yrs Avg Farming Experience

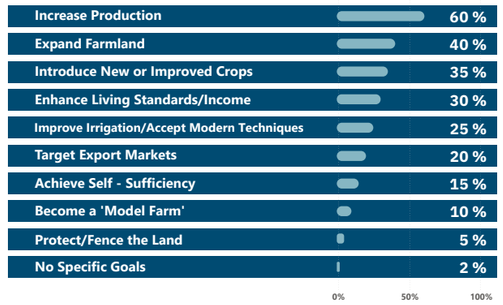
- **Predominantly male** sector with only 2% female participation
- **44%** of farmers older than 50 years
- Average household size: **13.5 members**

Readiness for Expansion



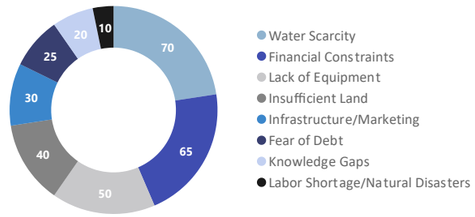
64% of farmers believe their land can be expanded by average of 4.2 feddans

Future Goals



Top priorities: **expand farmland** and **improve irrigation**

Obstacles to Expansion



Only **33%** of farmers willing to borrow to expand, **67%** hesitate due to repayment concerns

Market Dynamics

Current Channels and Development Gaps

On average, around 36% of farmers' produce is sold, with the rest consumed by the household. It seems that local production in Wadi Hajr is mainly for immediate and local consumption. The vast majority of farmers (84%) sell their produce directly to consumers. A smaller portion (14%) supplies local retailers, while only 1% sell to wholesalers outside the area. No significant export activity was recorded. This was supported by study findings from nearby markets. Market actors in Mukalla, both input sellers and wholesalers, could not cite any market activities from Wadi Hajr.

A SWOT analysis

of farming in Wadi Hajr based on the survey o farmers in the region is presented next.

SWOT ANALYSIS

Strengths

(~25%)[8] **Availability of Water Resources**
Presence of wells, springs and seasonal rivers.
Potential for groundwater extraction.

(~35%) **Fertile Soil and Land Suitability**
High soil quality for diverse crops.
Large tracts of arable land.

(~10%) **Abundant Labor and Agricultural Expertise**
Local communities with broad farming experience.
Willing workforce.

(~10%) **Strategic Location and Land Area**
Farms near water sources, favourable climates.
Potential for high yields through expansion.

(~10%) **Potential to Increase Production**
Growing demand for local products.
Openness to improved crop varieties.

Weaknesses

(~35%) **Water Scarcity**
Low rainfall and diminishing wells.
Unreliable irrigation infrastructure.

(~15%) **Financial Constraints**
Limited funding, high input costs, weak credit access.

(~15%) **Pests and Diseases**
sInsect pests, crop diseases, limited pesticide usage.

(~15%) **Lack of Essential Inputs & Equipment**
Insufficient availability of seeds, fertilizers, machinery.

(~10%) **Weak Infrastructure & Support Services**
Broken canals, poor roads, limited extension programs.

Opportunities

(~25%) **Increased Demand & Market Access**
Growing local markets, potential for export.

(~20%) **Investor Involvement & Financial Support**
NGOs, government grants, private investors.

(~15%) **Infrastructure & Resource Improvement**
Constructing/repairing canals, roads, storage facilities.

(~10%) **Education & Training**
Agricultural extension services, modern farming techniques.

(~10%) **New Technologies & Techniques**
Growing demand, improved crop varieties .

(~10%) **Expanding Production & Crop Diversity**
Arable land available for new, high-value crops.

(~10%) **Availability of Labour**
Readily available workforce for agricultural expansion.

Threats

(~20%) **Irrigation Challenges**
Growing local markets, export potential .

(~20%) **Natural Disasters & Extreme Weather**
NGOs, government grants, private investors .

(~20%) **Inflation & Economic Pressures**
Canals, roads, storage facilities .

(~=%) **Pests & Diseases**
Agricultural extension services, modern techniques .

10% **Infrastructure & Marketing Gaps**
Arable land for new,
high-value crops .

[8] Percentages indicate sample size percent agreement with the conclusion

Investment Overall Pros and Cons :

Pros

- **Availability of land:** Wadi Hajr has ample agricultural land available for cultivation.
- **Water resources:** The region has access to water resources, including groundwater and seasonal rains especially with the Wadi Hajr Watershed Project intervention.
- **Community support:** The local community is actively involved in maintaining existing water resources.
- **Government interest:** There are donor and governmental interest to support agriculture and water resource management.
- **Market demand:** There is a local market for agricultural products, especially dates.
- **International community** commitment to support the region.

Cons

- **Climate change:** The area is vulnerable to climate change impacts, including droughts, high temperatures, evaporation and floods. More frequent and severe hurricanes.
- **Mixing of sewage** with surface water, particularly in areas with shallow groundwater, leads to contamination.
- **Soil erosion:** The soil is prone to erosion due to floods.
- **Marketing challenges:** The region faces difficulties in marketing agricultural products due to poor road conditions.
- **Fragmentation** of agricultural lands limiting the potential for large-scale agricultural projects.
- **Political instability** disrupts government functions in water and agriculture sectors.

Stakeholder Perspectives & Engagement Strategies

30%	15%	52%	5%
Traders	Industry	Agriculture	Services

Private Sector Landscape: Motivations, Perceived Risks and Key Challenges

The study targeted all agricultural investors in Wadi Hajr (including the districts of Yaboat, Hajar and Mayfa'a). In addition, the study targeted around fifteen major multi-sector investors in Hadhramaut Governorate, of which ten interviews could be conducted. The sample profile includes 30% traders, 15% industry, 52% agriculture and 5% services. Investors are mainly motivated to participate in agriculture investments given real incentives that the government and other stakeholders can provide. Those involved in food value chains seemed more interested since they have expertise in the field. The majority are interested in finding lucrative investment opportunities in the country given the lack of opportunities and low purchasing power. Moving from targeting consumers to exports seemed to be emerging.

Challenges faced by the private sector investing in agriculture in Wadi Hajr

1. **Political Instability and Weak Rule of Law:** Concerns about political instability and the inability to enforce land rights create a risky investment environment. Past experiences of land disputes have led to significant losses for investors, making them wary of future investments. Authority commitment would reduce such challenge.

2. **Inadequate Infrastructure:** The lack of paved roads and essential infrastructure limits access to markets and increases operational costs. This remoteness is perceived as a significant barrier to logistics and overall business growth. A major challenge for Wadi Hajr that needs an investment consideration.

3. **High Costs and Low Returns:** Investors face high input costs, thin profit margins, and low purchasing power in the region. These economic factors make it difficult to achieve a profitable return on investment. A common challenge by local investors considering the agriculture sector which is could be due to lack of awareness of the importance of the sector.

4. **Limited Access to Finance:** High interest rates, substantial collateral requirements, and short payment terms restrict access to necessary funding for agricultural projects. Many investors are also unaware of investment laws that could facilitate their engagement in the sector.

5. **Trade Barriers:** High tariffs on imports of agricultural equipment and inputs, along with limited export services, create additional hurdles for investors looking to enter the market. The barrier could be overcome by investors who realize previous points with authority commitment to change perceptions of bureaucracy.

6. **Labour Shortages:** A shortage of qualified labour in low population areas makes it challenging to find skilled workers, further complicating investment efforts. Youth capacity building in agriculture could overcome the challenge in the long run.

7. **Complexity of Agricultural Management:** Transitioning from other sectors, such as trade or tourism, to agriculture requires different management skills and a more complex understanding of the agricultural value chain, which can be daunting for investors.

8. **Government Bureaucracy:** Complicated regulatory processes and bureaucratic hurdles discourage investors, leading them to seek opportunities in less complicated sectors. Similar to trade barriers, local authorities need to change local perceptions by easing their processes.

Case Studies:

Private Sector Challenges

Case study 1

In an interview with high profile Hadhrami investor, the bottom line was the political instability and the weak rule of law. An investor said, “we can provide the project with our land, and we give up all of its returns for the most vulnerable and we hope mega agriculture projects can take place, but we don’t have the appetite to invest in agriculture in Wadi Hajr. We have made huge agricultural investments in Wadi Hadhramaut and after millions of dollars being spent, some individuals claimed their ownership of this land, and we could not enforce any land rights, and we don’t think we are ready now. Alternatively, we can dedicate our NGO arm to support the Wadi Hajr Watershed Development Project.”

Case study 2

The interviewee was a multisector investor. He was experienced in the tourism sector and has tried to move into other sectors. He has been engaged in healthcare and decided to try agriculture. His first shock was that moving from the services sector into the agriculture required a different set of management and administration skills. “After four years in agriculture and over 20 million SAR, I have closed down my greenhouses.” The challenges were multifaceted. He needed to look after marketing, agriculture operations, complex science and management, as he described it. The lesson learned was that agriculture on a large scale requires more complex value chain development beyond the scope of one organization.

Investment Opportunities in Wadi Hajr

The following tables includes a list of opportunities for investments that could be further expanded.

Modern Irrigation Systems

Investment in drip, sprinkler, and water-saving technologies to improve water use efficiency and crop yields

Date Palm & Fruit Processing

Facilities for processing, packaging, and exporting dates and fruits, including valueadded products

Livestock & Dairy Production

Development of fattening farms, dairy production, poultry, and improved breeds and animal health services

Forage & Feed Industry

Production of concentrated animal feed and cultivation of drought/soil-resistant forage crops

Beekeeping & Honey Production

Expansion of beekeeping operations, honey processing, branding, and export leveraging regional tradition

Agricultural Infrastructure

Building rural roads, storage facilities, cold chains, and logistics to support farm-to-market supply

Agri-Tech & Extension Services

Modern agricultural technologies, greenhouses, climate-smart solutions, and training services

Veterinary & Animal Health

Private veterinary clinics, mobile animal health units, and supply of vaccines and medicines

Financial Services & Credit

Microfinance, agricultural loans, and insurance products tailored for farmers and agri-businesses

Renewable Energy for Agriculture

Solar-powered pumps, cold storage, and processing units to reduce costs and improve sustainability

Agri-Cooperatives & Partnerships

Formation of producer groups, marketing cooperatives, and public-private partnerships

Investment Landscape from farmers' perspective

Existing private-sector involvement in Wadi Hajr agriculture is low at best. Most farmers rely on personal or family capital, supplemented occasionally by small-scale local wholesalers. Formal investment or bank loans—from either domestic or international entities—remains rare due to perceived risk, a challenging business environment, and limited financial products tailored to smallholder farming.

Perceived Benefits and Risks:

Benefits

- Potential for higher yields and better product quality through improved seeds and irrigation
- Access to larger markets, including potential export channels, especially for high-value crops
- Community-wide gains in employment, training, and infrastructure development

Risks

- Potential for higher yields and better product quality through improved seeds and irrigation
- Access to larger markets, including potential export channels, especially for high-value crops
- Community-wide gains in employment, training, and infrastructure development

Barriers to agriculture investment by local farmers

Water Scarcity - 70%
Farmers cite inadequate water resources as a primary constraint

Financial Constraints - 33% vs 67%
Only 33% of farmers open to loans, 67% worry about repayment or carry debt

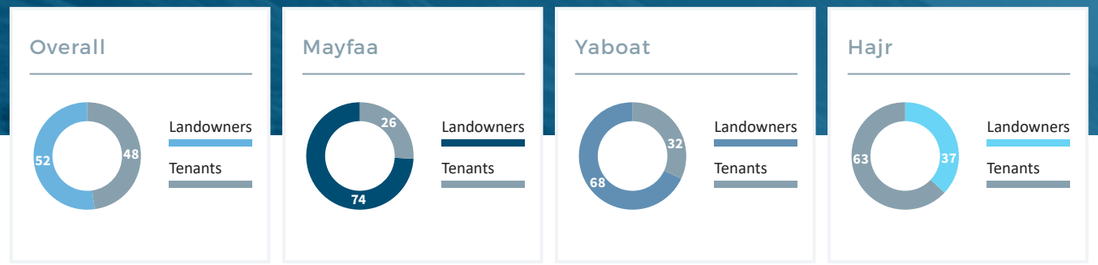
Infrastructure Gaps
Deteriorating irrigation canals, poor road networks, and lack of storage facilities

Technical Capacity - 11% vs 3%
Awareness of modern irrigation techniques (11%) doesn't translate to usage (3%)

Market Volatility
Price fluctuations and limited buyers reduce investor confidence

INVESTMENT LANDSCAPE
FROM FARMERS' PERSPECTIVE

Landowners' perspective



The study asked farmers if they are interested in partnerships and cooperation with others. All study participants were willing to cooperate with fellow farmers and found no social challenges with such arrangements. The data reveals an exceptionally high level of social cohesion among farmers, with 100% expressing willingness to cooperate with their peers and 99% noting strong family/community support.

The study classified study participants into landowners and tenants. Around 52% of study participants were landowners; more in Mayfaa (74%) and Yaboat (68%) than Hajr (37%). The concept of "Fakheith" is the terminology for tenants who take half of the produce for their work in the farm and the other half goes to landowners. Another concept of double Fakheith (appeared in Hajr district) when a tenant would sublease it to a third party, appeared mostly in Hajr district (middle region). This double lease of land creates conflict and challenges to ownership. One landowner reported a conflict with their tenant for land negligence that was disputed in court. The Fakheith is mostly related to palm farms and lasts for good and is not normally changed unless paid out.
New actors into the valley would need to satisfy various local stakeholders. Labourers and tenants need to maintain their livelihoods, landowners are interested to expand and do not want conflicts with their current labour and tenants. Farmers and landowners are open to leasing their land or partnering with investors through various arrangements like profit-sharing, rent-based leasing, or capital injections. They are keen to have an income in any new structure and would like to establish clear structures for managing profits and losses in such partnerships, ensuring fair allocation of costs and benefits. They recognize the potential for community and economic development through outside investment.

One key informant suggested pilot projects that could generate a successful story to show case an example of large-scale agriculture project for people to see and follow as suggested in the in the Integrated Agricultural Development Zone.

Supporting local youth and entrepreneurs to experiment new venues and support agriculture in Wadi Hajr could help valuable with Agri-Innovation Hubs. Capacity building in agro business, apprenticeship, microfinance, among others.

The study conducted follow-up calls to landowners to identify emerging themes. Most of the land in Wadi Hajr is not fully cultivated due to limited financial resources. While many landowners are hesitant to lease or sell their land, some indicated a willingness to do so if offered a suitable return. A traditional system known as 'Al-Fakheed' exists, where individuals cultivate land with the owner's consent and share profits based on mutual agreements. This system is primarily found in palm farms and has been passed down through generations.

Many landowners expressed interest in obtaining bank loans to expand their agricultural activities. Landowners sounded optimistic with the projected and shared historical facts about the region's fertility.

Landowners did not express significant concerns about the project, viewing it as a positive development. However, some were worried about neglecting the land and wasting resources. The majority welcome private sector involvement, believing it could help improve their current situation. They were also open to the establishment of crop processing facilities, which could add value to their products and improve market access.

However, it should be kept in mind that the region faces significant infrastructure challenges, particularly in terms of roads, electricity, and water supply. Additionally, there is a strong need for energy systems and various agricultural services to support development efforts.

While most stakeholders are open to private sector involvement, some expressed reservations about investors from outside the local community. Ensuring that investments align with the interests of local stakeholders will be critical to the project's success.

Gender Lens

Women in rural areas typically have more freedom than women in urban areas in Yemen because there are less restrictions. Study findings indicate that women prefer subsistence farming and crops that contribute to food security. Women work in the farm and when the workload increases, there is a risk that girls are not allowed to go to school of that women cannot attend other activities. Women's time poverty, with a parallel burden of unpaid care work, is a crucial factor to consider. Most experience from Yemen, as well as from other countries, shows that women contributing to household income continue to bear the brunt of responsibility for most household chores and care of children. The bottom line is that gender implications need to be analyzed in specific interventions.

International experience from agricultural projects in Asia and Africa suggests that projects with a strategy and intentional agenda for women's empowerment have better outcomes than projects just aiming at engaging women in agricultural activities . Reaching out to women and ensuring that they benefit from various project components does not in itself lead to their empowerment. An intentional empowerment agenda addressing issues such as freedom of movement, respect among household members, partner violence, household decision making, ownership of productive assets and control over own income is required. Systems of property rights that favour men and the difficulties women face in accumulating productive assets that they can control need to be addressed so that women can build up control of assets.

FAO's experience is that insurance and credit schemes (either formal or informal) are fundamental components for projects aiming at enhancing rural women's economic empowerment. Interventions that work through women's groups are more beneficial to poor rural women with limited mobility and low level of education.

It should be kept in mind that whilst individual projects may be able to achieve women's empowerment at an individual level, it is beyond the scope of an agricultural project to accomplish a transformational change of social norms and gender related restrictions at community level in a patriarchal dominated society such as the one in Yemen.

Though only 2% of surveyed farmers are female, targeted interventions—especially capacity building and financing tailored to women—can help unlock untapped labour and entrepreneurial potential.

2%

Female farmers surveyed

Women in Rural Yemen

More freedom than women in urban areas due to fewer restri tions.

Prefer subsistence farming and crops contributing to food security.

Risk of girls not attending school when farm workload increases.

Limitations of Individual Projects

While individual projects may achieve women's empowerment at an individual level, it's beyond the scope of an agricultural project to accomplish transformational change of social norms and gender-related restrictions at community level in Yemen's patriarchal society.

Public Engagement

Innovative ideas to be encouraged in the Wadi Hajr development intervention are listed below. These ideas could be supported and encouraged by the public sector to pursue development of the area.

Contract Farming Program for Wheat

Launch a governorate-sponsored contract farming program for wheat, guaranteeing prices and covering input costs for farmers who commit to supply to major millers. This reduces import dependence, ensuring a market for local production.

"Hadramout Brand" for Premium Dates

Develop a regional branding and certification program for high-quality dates, enabling premium pricing and export opportunities. This could involve quality control, packaging standards, and marketing support.

Mobile Veterinary Clinics

Support private veterinary practices to operate mobile clinics, reaching remote areas and providing essential animal health services. This addresses a critical gap in livestock care.

Drought-Resistant Forage Seed Subsidies

Subsidize the cost of drought-resistant forage seeds for livestock farmers, encouraging the adoption of climate-smart practices and reducing reliance on imported feed.

Agri-Tourism Initiatives

Promote agri-tourism by supporting farms that offer visitor experiences (e.g., date palm tours, honey tasting, farm stays). This diversifies income streams and raises awareness of local products.

Solar-Powered Cold Storage Grants

Provide grants for farmers to install solar-powered cold storage units, reducing post-harvest losses and enabling better market access.

"Innovation Vouchers" for Agri-Tech

Offer innovation vouchers to farmers who adopt new technologies (e.g., precision irrigation, green tech). This incentivizes experimentation and technology adoption.

Land Tenure Security Program

Implement a program to clarify and secure land tenure rights, reducing investment risks and encouraging long-term agricultural development.

"Diaspora Bonds" for Agriculture

Issue diaspora bonds targeted at agricultural investment in Wadi Hajr, tapping into the financial resources and expertise of the Hadrami diaspora.

Conclusion

Wadi Hajr possesses considerable untapped agricultural potential that, if properly harnessed, can significantly contribute to Yemen's food security, economic growth, and rural livelihoods. The success of this endeavour is contingent upon creating an attractive and stable environment for private sector investment, coupled with targeted support for local farmers and communities. By implementing the strategic recommendations outlined—focusing on improved water management, value chain development, robust public-private partnerships, capacity building, and innovation—stakeholders can transform Wadi Hajr into a thriving agricultural hub. This will require a concerted and sustained effort from government bodies, international partners, the private sector, and the local communities themselves, working collaboratively to overcome existing challenges and seize the promising opportunities that lie ahead.

It was not the objective of this study to formulate a roadmap for private sector investment in increased agricultural productivity. Special studies should be conducted to assess and understand the specific opportunities and their potential for investment, in order to further support and encourage private sector engagement.

- Government
- Private Sector
- LocalF armers
- International Partners

Key Actions Required

- Overcome Barriers
- Leverage Strengths
- Harness Opportunities

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Annex: Strategic Investment Blueprint:
Integrated Agricultural Development Zone

The Wadi Hajr region presents significant potential for agricultural investment, driven by its natural resources, community support, and strategic importance for food security in Yemen. This Annex outlines a proposed investment framework, identifies specific opportunities and details the perspectives, perceived benefits, risks and barriers from the viewpoint of local farmers and the community.

The proposed investment aims to leverage Wadi Hajr's potential to address food security gaps, enhance economic efficiency, and create employment opportunities through an integrated approach combining crop and livestock production. This would operate as a pilot investment project that could be replicated.

Evidence regarding advantages of Integrated Crop-livestock Production Systems is available from global experience. Studies point to increased net and gross return, improved benefit-cost ratio and increased employment , as well as improved food security and improved sustainable soil management . One study shows a shift from government emergency relief towards more investment in feed blocks, improved sheep reproduction and drought tolerant plants . An international consultation on integrated crop-livestock systems arranged by FAO points t0 economic, social and environmental benefits from such integration [14].

Partnership Model and Investment Pathways

The suggested model is to establish an agricultural investment company with multiple objectives, including direct investment through land cultivation and cooperation with agricultural cooperatives. The company would also engage in contract farming, partnering with agricultural cooperatives to cultivate specific crops and purchasing the harvest in return for payments. The model would replicate the fishery sector that buy fishery from local markets and local fishers, add value through processing and export. The suggested model would create a sizable agriculture company that could supply farmers with modern equipment and provide extension services for qualitative and quantitative objectives. The economy of scale would leverage the comparative advantages in Wadi Hajr and overcome the challenges faced by local producers financially and technically.

Vision: A Resilient and Economically Vibrant Agricultural Sector

The vast majority of residents in Wadi Hajr are engaged in both crop and livestock agriculture, particularly in the production of grains (such as wheat, sorghum, and sesame), vegetables (notably onions and cucurbits), and fruits (especially date palms). In livestock production, sheep and goats constitute over 60% of the total livestock units in the valley. Livestock production relies almost entirely on natural pastures and cultivated fodder. In 2023, Yemen's total wheat imports were valued at $560 million. This made Yemen the 34th largest importer of wheat globally. Wheat was also the most imported product in Yemen during that year. Therefore, **the main objectives of this project are:**

1. *Increase grain production, especially wheat, through both horizontal and vertical expansion to address food shortages.*
2. *Establish integration between crop and livestock production, utilizing farm resources for fodder and pasture, and using treated animal manure as organic fertilizer for crops.*
3. *Achieve economic efficiency in the use of available production resources, maximizing economic surplus to support the national economy.*
4. *Increase red meat production by improving animal weight through proper nutrition and veterinary practices.*
5. *Contribute to closing the food gap in Yemen.*
6. *Create job opportunities for local labour, addressing unemployment in the region.*

Project Core Components

The project combines both crop and livestock production, serving as a model for integrated farming where the outputs of one component become essential inputs for the other. Crop production will provide not only food products but also green and dry fodder and concentrated feed for livestock. In turn, animal manure will be used to improve soil fertility, and crop residues will serve as animal feed.

Component 2: Crop Production
The crop production component includes the following:

Date Palm
Focus on cultivating high-quality foreign varieties **(such as Barhi, Khalas, and Sukkari)** and local varieties **(such as Jazza, Mujraf and Maymouna).**

Vegetables
Emphasis on high-value, cost-effective crops like **onions** in the winter season, and **cucumbers**, **tomatoes**, and **hot pepper**s in greenhouses year-round.

Grains
Wheat in the winter season (using high-yield varieties producing 5–6 tons/hectare) and **sorghum** in the summer, serving both livestock feed and human consumption.

Fodder
Main **crops** for livestock feed include alfalfa (grown year-round) and **sorghum** (for both **fodder** and **grain**, used in concentrated feed during summer).

Component 2:
Livestock Production

Traditionally, sheep production is non-intensive due to poor pastures and limited ability to fatten lambs. The valley's pastures can produce lambs, but fattening is difficult due to limited feed resources and low rainfall, increasing risk, especially for young animals. Most producers keep lambs for a year or more before selling, which strains pastures and increases risk of loss, especially during dry seasons.

By producing sufficient fodder and concentrated feed, and applying scientific breeding and fattening methods in well-equipped barns (with proper ventilation, hygiene and animal care), the project aims to:

Breeding Barns

Import female goats and sheep adapted to Wadi Hajr's conditions.

Genetic Improvement

Introduce male goats and sheep of productive breeds (e.g., Shami) with desirable traits.

Crop Production

Fruits · Vegitables · Grains · Fodder

Livestock Production

Breeding Barns · Genetic Improvement

Project Structure

Crop Farm: 1,500 hectares at full project scale, divided as follows:

1/3 (500 ha): Date palms (sustainable crops)	**1/3 (500 ha):** Wheat, onions (winter), protected alfalfa (year-round)	**1/3 (500 ha):** Sorghum, watermelon, alfalfa (summer)
700 ha dedicated to livestock feed (green/dry fodder, grains for concentrated feed)	**500 ha** for fruit, especially dates, suitable for the valley's conditions	**Remaining area** for onions, cucurbits and protected crops, suitable for various soils and year-round production

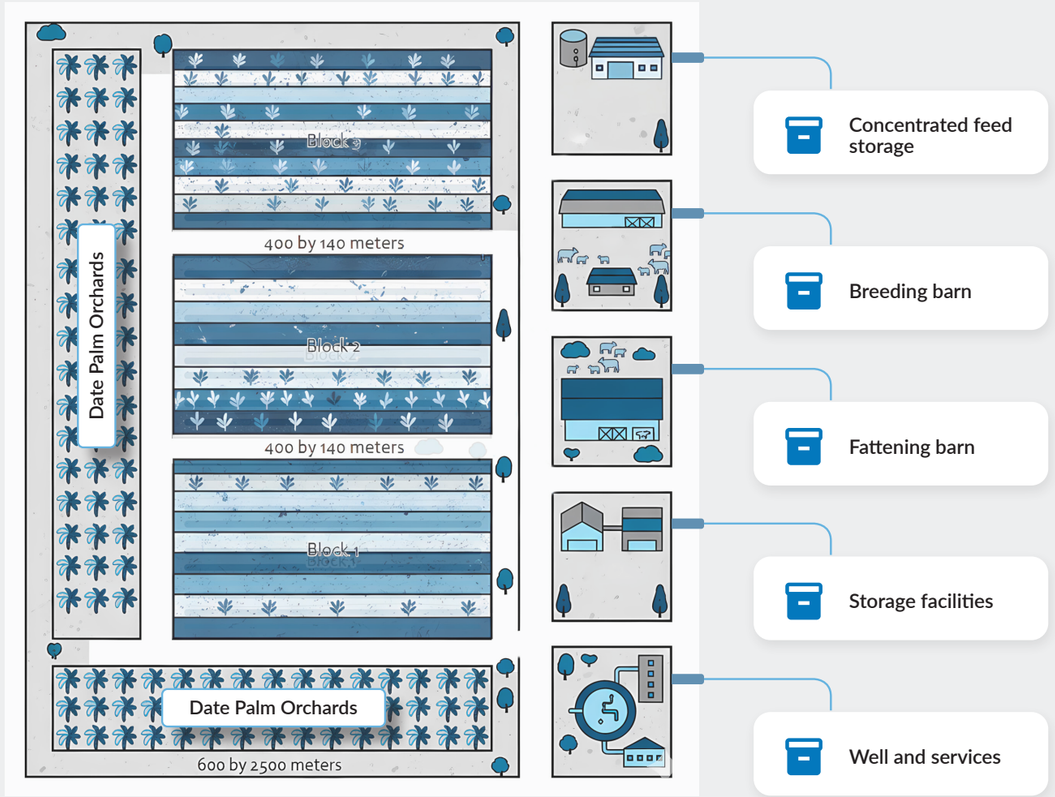
Proposed Crop Composition
(by the third year)

Winter Season (50%)	
Wheat	500 ha
Onions	100 ha
Alfalfa	100 ha
Date Palms	500 ha
Fallow land	100 ha
Protected Crops	200 ha
Total =	**1,500 ha**

Summer Season (50%)	
Sorghum	500 ha
Cucurbits	100 ha
Alfalfa	100 ha
Date Palms	500 ha
Sesame	100 ha
Protected Crops	200 ha
Total =	**1,500 ha**

Farm Layout (Summary)

Figure 5: Integrated Agriculture Development Zone



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