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"تكامل قطاعي المياه والزراعة: مفاهيم وتطبيقات"

Integration of water – Agriculture sector  
in Egypt : concepts and applications

Aquaponics and its role in realization Water  
and food security



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## Background & challenges

- Rethinking Farming in the context of:

Water Scarcity

Energy

Climate Change

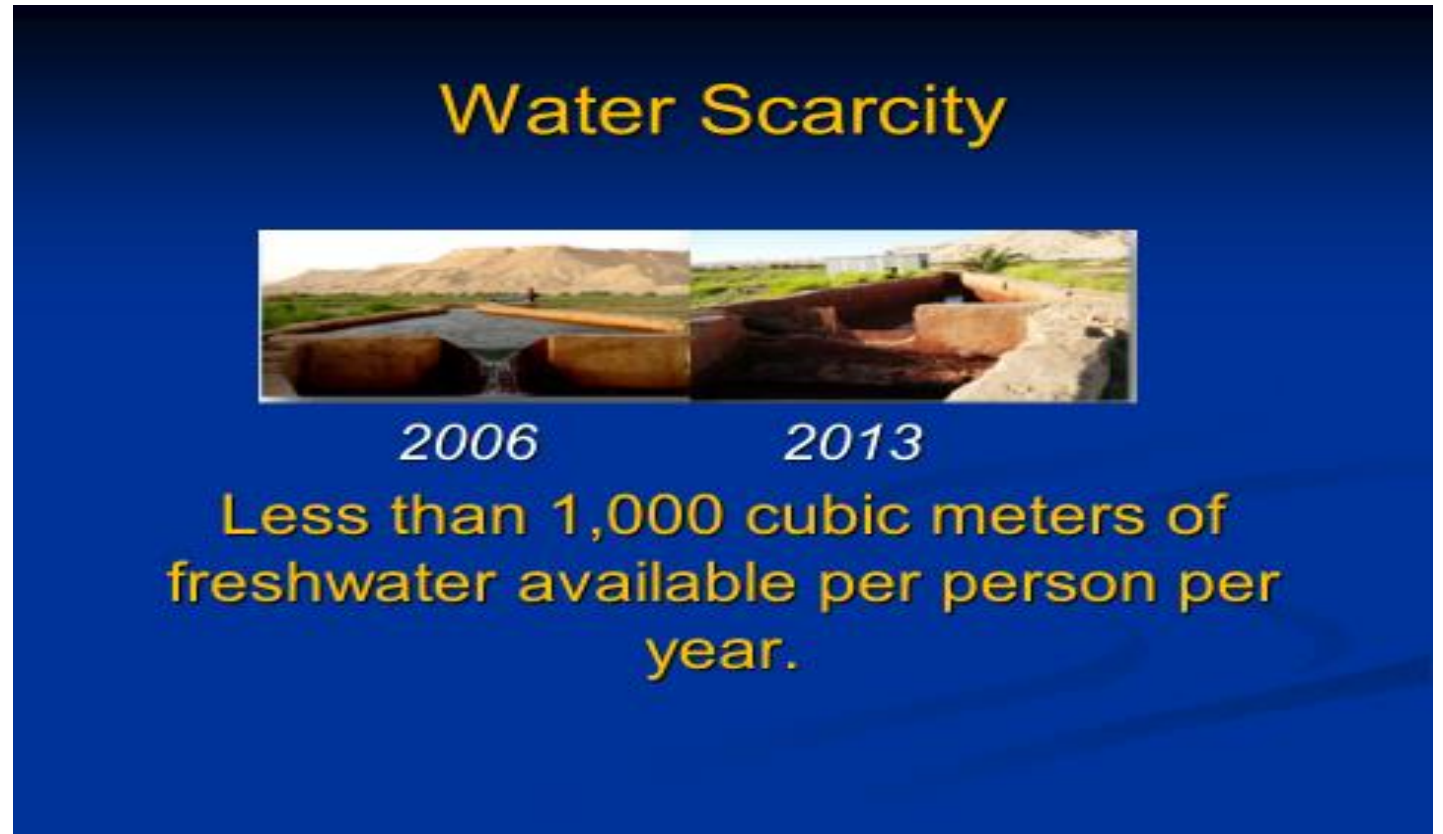
Food Security



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# Water Scarcity



- Egypt is expected to head into Extreme water scarcity (500 cubic meters per person per year or Less) as soon as 2025





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# Energy







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Displaced population: 3,800 000  
Lost cropland: 1,800 km<sup>2</sup>

Displaced population: 6,100 000  
Lost cropland: 4,500 km<sup>2</sup>

# Climate Change



*Figure 4: Potential Impact of Sea Level Rise: Egypt's Nile Delta.  
Source: Sermonett et al., 2005.*



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Food security is defined by the Food and Agriculture Organization (FAO) as:

- when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life.

# Food Security Defined







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# Agriculture and Food Security



**7.5 million feddan of irrigated land - 75% old lands, 25% reclaimed**

**Striking growth in export of horticultural crops**

**Highly productive agricultural system with 2-3 planting seasons and a 172% crop intensity**

**Significant growth in yields per hectare of major crops over past decades: 52%, 37%, and 34% for wheat, maize, and rice respectively**



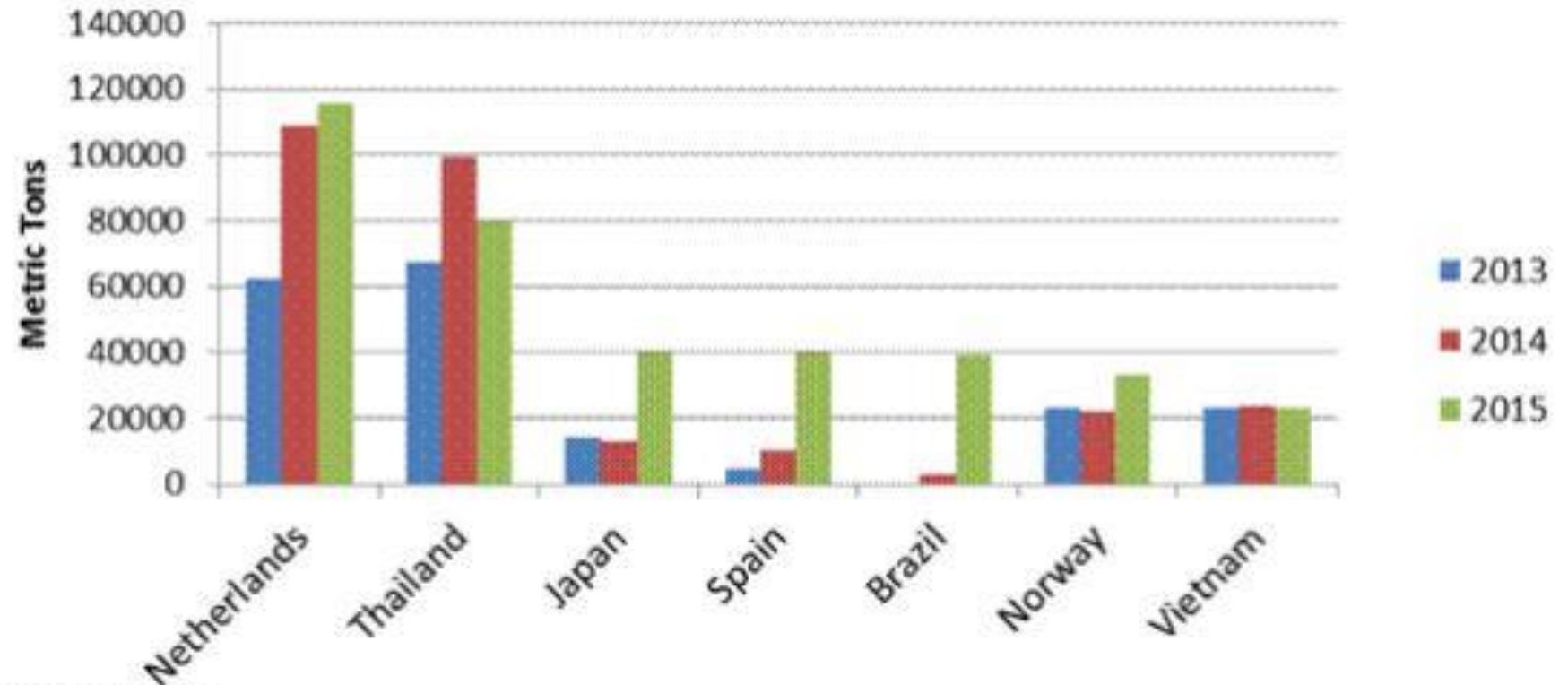
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# Aquaculture and Food Security

**Figure 6: Top Origins Exporting Fish and Seafood Products to Egypt 2013-2015**



Source: CAPMAS

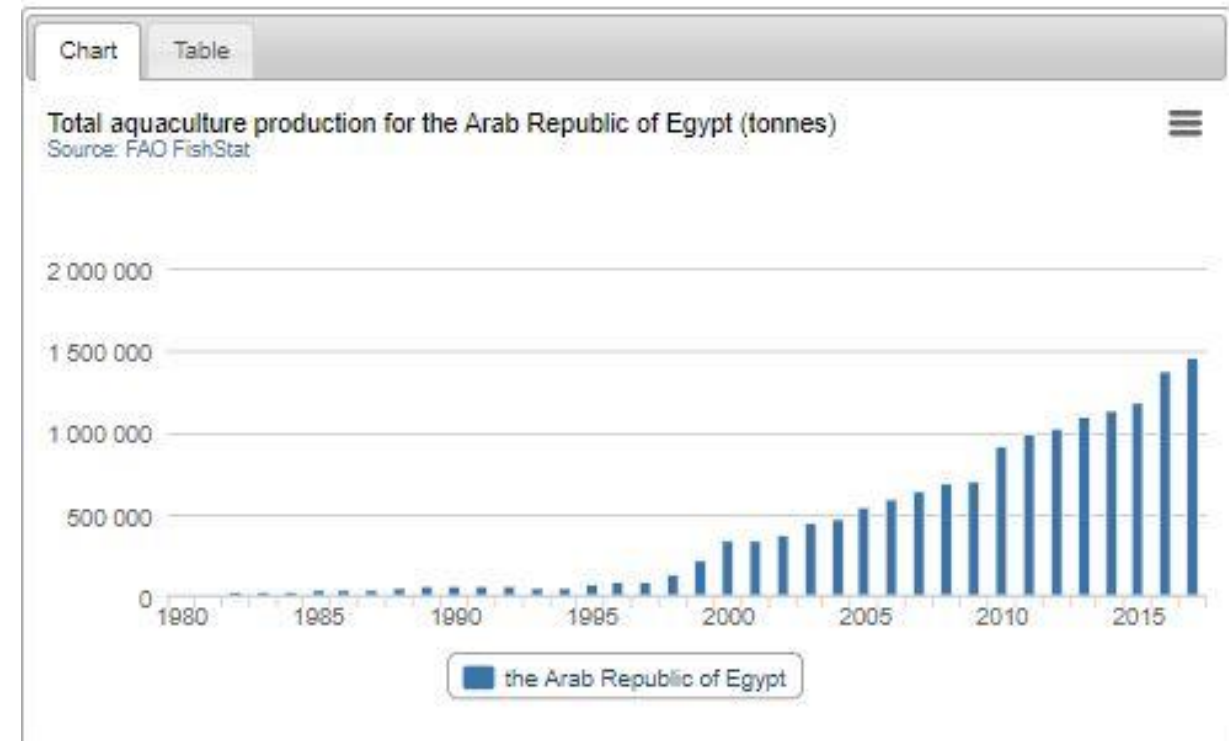
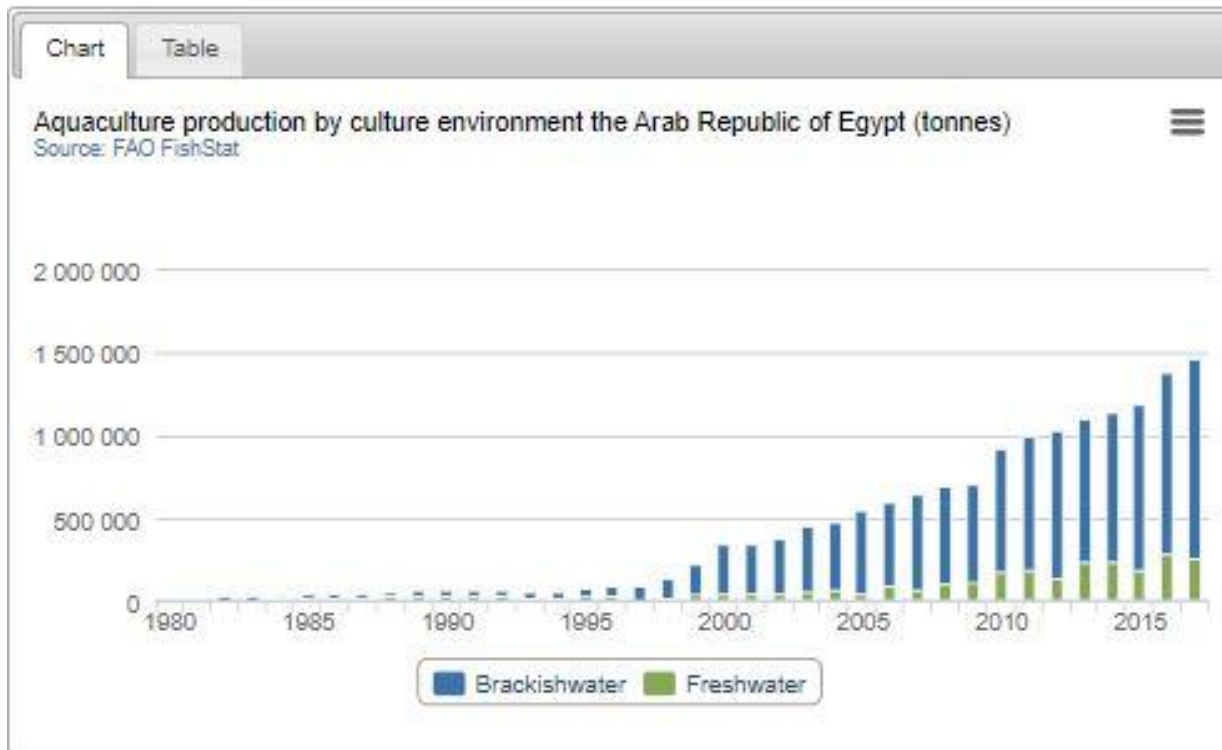




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# Aquaculture and Food Security





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**Table 2. Egypt Imports, Exports & Values of Seafood Commodities (2013-2015).**

SEAFOOD TRADE	2013		2014		2015	
	Quantity (Tonnes)	Value (US\$'1000)	Quantity (Tonnes)	Value (US\$'1000)	Quantity (Tonnes)	Value (US\$'1000)
Total Imports	288 360	600 332	585 410	752 457	495 775	768 367
Total Exports	21 427F	25 855	28 775	35 160	32 851	31 734
Deficit in Trade Balance	266 993	574 477	556 635	717 297	462 924	736 633

Source: FAO Fisheries Statistics, 2017.





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**Yet, spectacular gains in production fail to meet the levels of  
national food security, outpaced by population growth.**

ومع ذلك ، فإن المكاسب المذهلة في الإنتاج تفشل في تلبية مستويات  
الأمن الغذائي الوطني ، التي فاقها النمو السكاني





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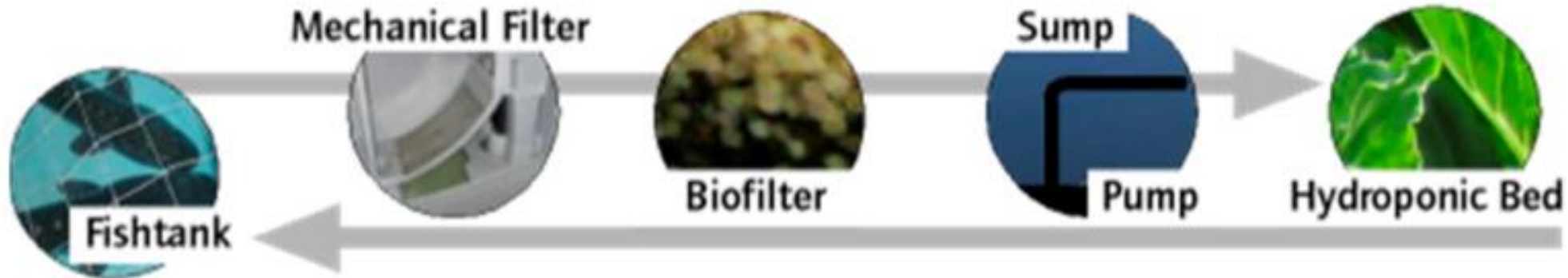
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# Aquaponics

- Aquaponics is an integrated multi-trophic system that combines elements of recirculating aquaculture and hydroponics



**Figure 2.** Basic aquaponic system layout.





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# Aquaponics

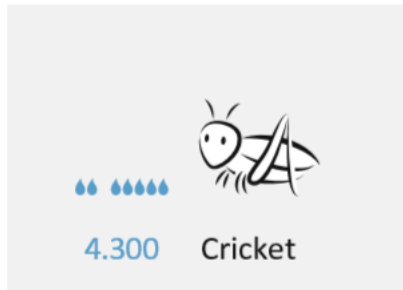
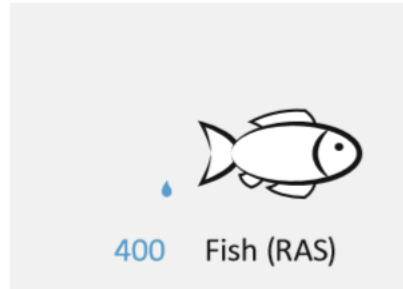
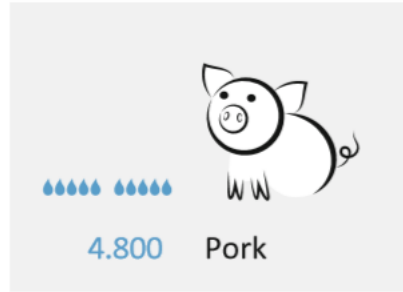
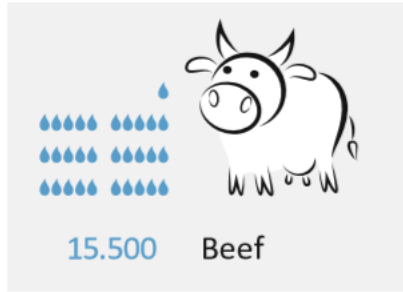




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**Water Footprint** (litres of water per 1 kg)



💧 One Drop (shown in the illustration) is equivalent to 500 litres of water.

# Aquaponics



Plastic ponds, Abdelsalam Hegazy fish farm in Kafr El Shaikh Governorate



Concrete ponds; Ismail Radwan fish farm in Kafr El Shaikh Governorate





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# Integrated Water Management

## Global water partnership:

a process which promotes the coordinated development and management of water, land and related resources, in order to maximize the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems.





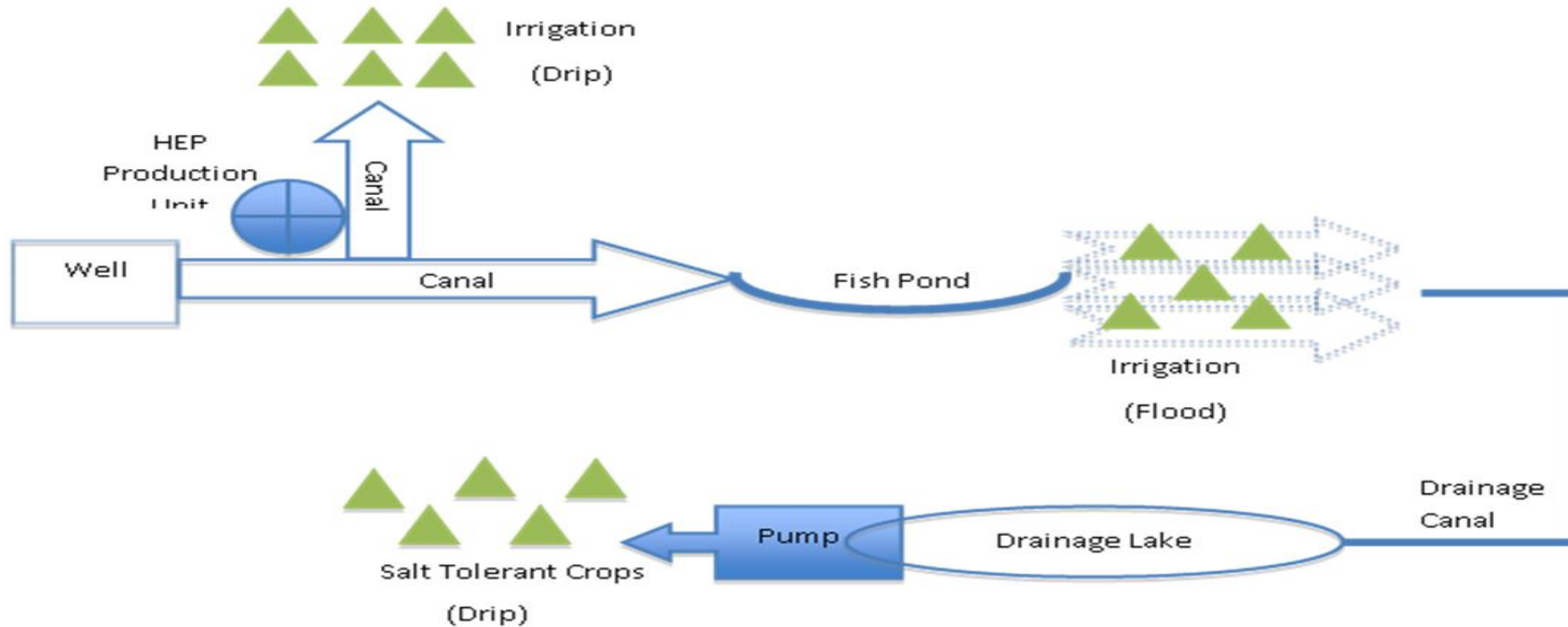
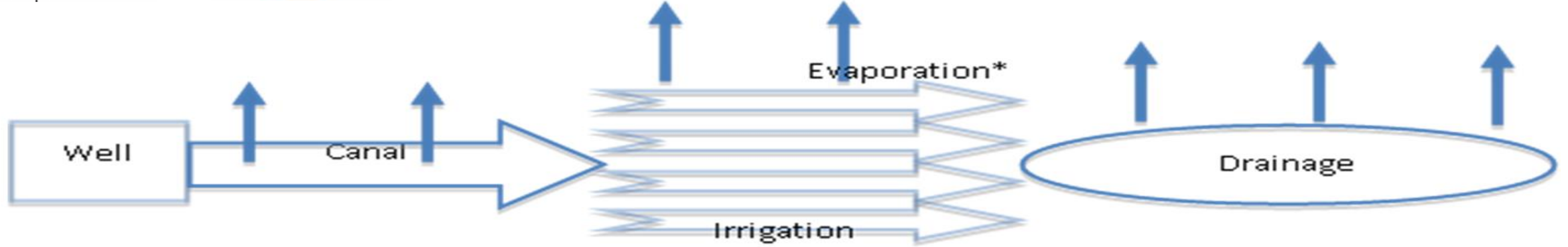
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# Drainage Reuse, Drainage Lake Abu Minqar Oasis







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# Aquaponics Greenhouse





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# Circular, Integrated farming

- Integrated farming System with Aquaponics (fish and clover) and sheep
- Circular system, making use of all resources is the most efficient way







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# Integrated Farming

- Making use of all resources and by-products
- Example from Fayoum: Fish, ducks, aquaponics, greenhouse, seedlings, open drip irrigation and growing area
- Save on fertilizer and grow more diverse food



