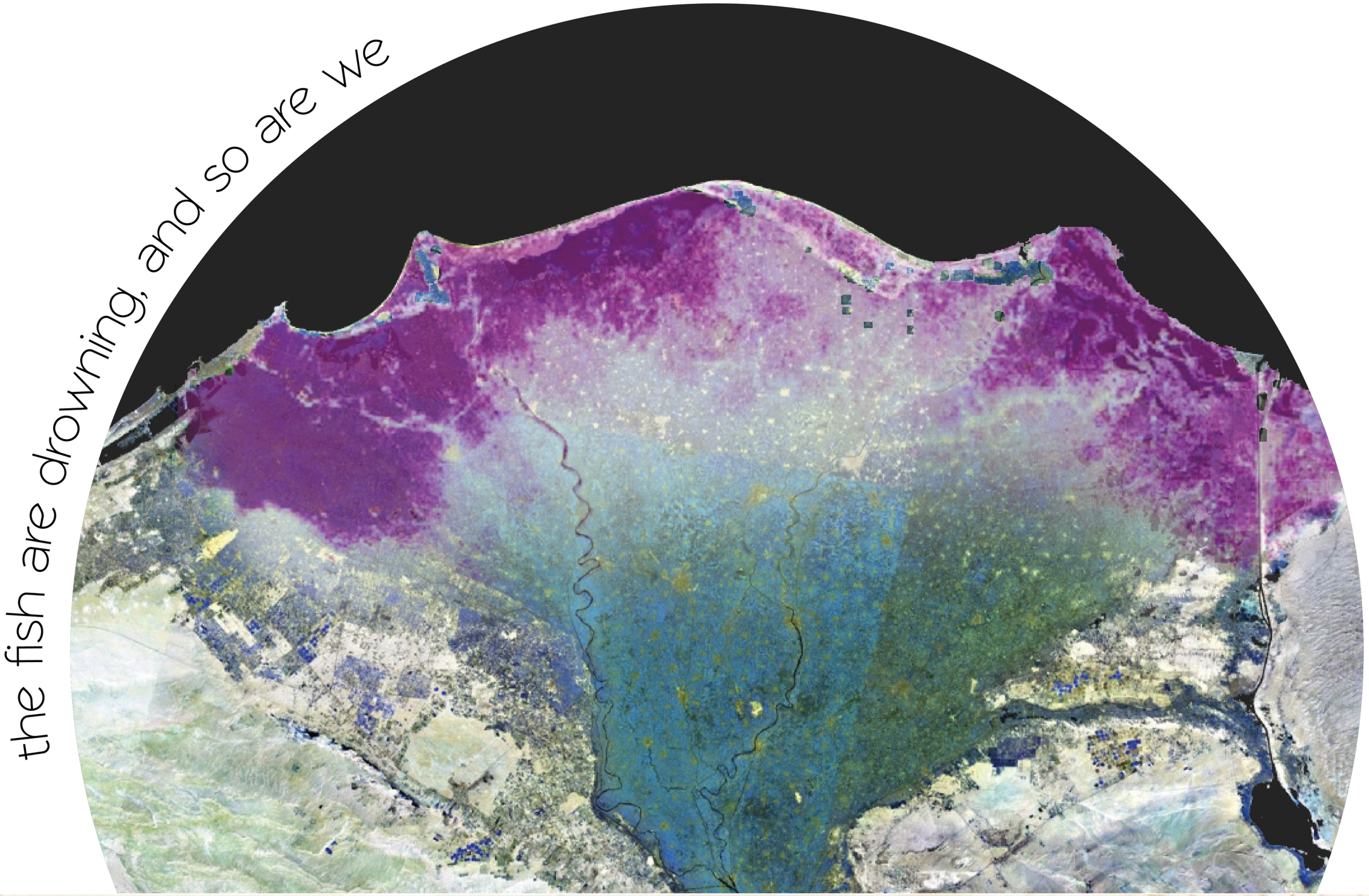

Country /City	Germany / Karlsruhe
University / School	Karlsruhe Institute of Technology - KIT
Academic year	2022
Title of the project	The fish are drowning and so are we
Authors	Sascha Seidt

TECHNICAL DOSSIER

Title of the project	The fish are drowning and so are we
Authors	Sascha Seidt
Title of the course	Mein schöner Garten- Eine (Klima) gestresste Idylle
Academic year	WS 2022/2023
Teaching Staff	Susanne Gerstberger, Arturo Romero, Prof. Henri Bava
Department / Section / Program of belonging	Chair of Landscape Architecture
University / School	Karlsruhe Institute of Technology- KIT

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Written statement, short description of the project in English, no more than 250 words

Alexandria in Egypt is a lively city with a lot of traditional fishing. Unfortunately the current farming conditions and political regulations are challenging not only for the farmers but even more so for the environment. With the rising sea level and simultaneous sinking in the Nile delta, more and more salt water is getting swept into the basins. The need for desalination grows, though the process is very energy intense and pricy. Leaving private farmers no choice but to abandon their generation-old work and lifestyle.

With this theoretical design project, I wanted to develop an alternative desalination process using native plant species in different biomes. The resulting landscape not only expands the fishing market and offers more attractive working conditions but contributes to much-needed conseration and the restoration of biodiversity.

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12th International Biennal Landscape Barcelona

Barcelona **November 2023**

SCHOOL PRIZE

ppt= g Salz/kg Wasser

Red Mangrove Forest 26-35ppt	Oysterbay 26-35ppt	Black Mangrove Forest 15-26ppt	Saltswamp 5-15ppt	Oligohaline Swamp 0-5ppt	Freshwater Pond >0.5ppt
Red Mangrove	Halophiles	Black Mangrove	Red Mangrove	White Mangrove	Egyptian Lotus
Tamarix	Sea Lavender	Red Mangrove	White Mangrove	Dates	Papyrus
Mangrove Grass	Arthrocaulon macrostachyum	White Mangrove	Marsh Samphire	Swamp Rose Mallow	Bamboo
Glasswort	Tetraena alba	Cushion Bush	Hardy Iceplant	Lantanas	Egyptian Cotton
Salt Tree	Sevada schimperi	Sea Purslane	Pickle Weed	Narrowleaf Cattail	Water Primrose
Sea Purslane	Tetraena simplex	Saltwort	Saltwort	Quinoa	Water Hyazinths
Nutsedges	Suaeda villosa	Killifisch	Wax Myrtle	Cordgrasses	Carob
Salsola villosa	Haloxylon salicornicum	Amphipoda	Coastal Willow	Leather Fern	Gum Arabic
Egyptian Corals	Gilt-Head Bream	Egyptian Corals	Mussels	Molly	European Eel
Grey Mullet	Emperor Angelfish	Blue Crab	Fiddler Crab	Ptychadena nilotica	Pond Apple
Mangrove Crab	Moray Eel	Bryozoa	European Pond Turtle	Crayfish	African Sharptooth Catfish
Brine Shrimps	Oyster	Breadcrumb Sponge	Hermit crab	Trumpet Snails	Nile Crocodile

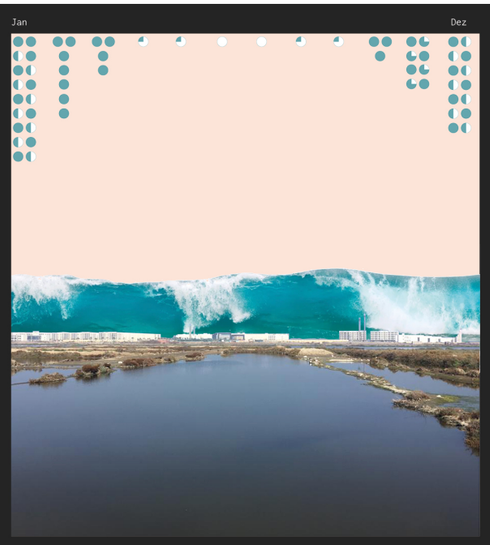
Earth‘s largest oasisis also one of the most economically relevant areas in Egypt. With 28% of Egypts jobs being within the agricultural sector, a major part of it is located here.Besides cotton and grain, fish farms are highly relevant. More than 1.92 mil tons of fish are farmed annually in Egypt, generating revenues of $5 billion. The global fish market is becoming an increasingly lucrative source of income, with a rise of $271.61Bn in 2017 to $376.48Bn in 2025. Furthermore, global fish consumption is estimated to increase by another 16.3%, to 180 mil tons by 2029. As a result, fish exports are becoming increasingly interesting for the Egyptian economy.

Fish farms within the Nile Delta vary drastically, posing major political and financial challenges to farmers. The number of farms in the Middle East is fixed, so there is relatively little competition. Farm rents are passed down from generation to generation, such as in western Alexandria. In 2018, however, rent increased by a factor of 10, while non-payment leads to either expropriation, or destruction of the farm. Furthermore, a military-run competitor, with a lot of government support, entered the market. Potential revenues continue to be diminished by poor farming conditions. There is currently no fish farm in Egypt that exports to the EU, as the exports don‘t meet the quality requirements of EU regulations. This is mostly due to governmental decisions, as farms are not allowed to operate with fresh water and are dependent on sewage. Besides the contamination of water and fish, the oxygen supply is one of the biggest problems. To prevent the waters from dead-zoning, they are operated as far away from agricultural areas as possible.

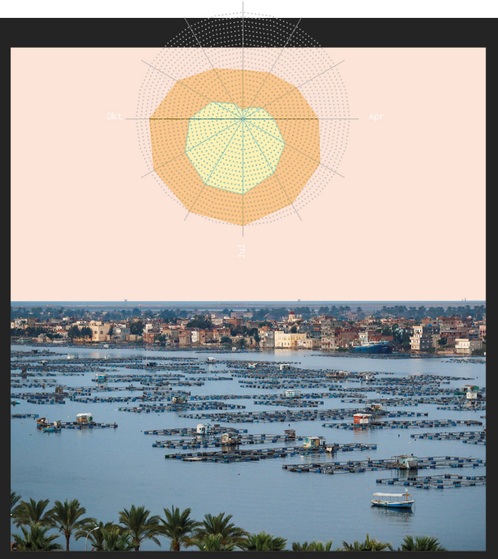
Rosetta in northern Egypt has cleverly solved the problem of water supply by using floating farms on the spur of the Nile. Nevertheless, fish excreta and food residues that are not washed away quickly enough, causing significant water pollution and poor living conditions for the fish.

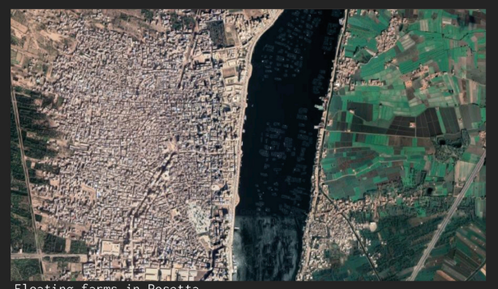
A very shocking example of large-scale fish farming is the Al-Fayrouz facility, commissioned in 2021, which covers 10,000 hectares and continues to grow. Operated by the National Company for Fisheries and Aquaculture, it has desalination plants, fishing fleets, ice storage and transportation facilities, without having any form of green energy generation itself.

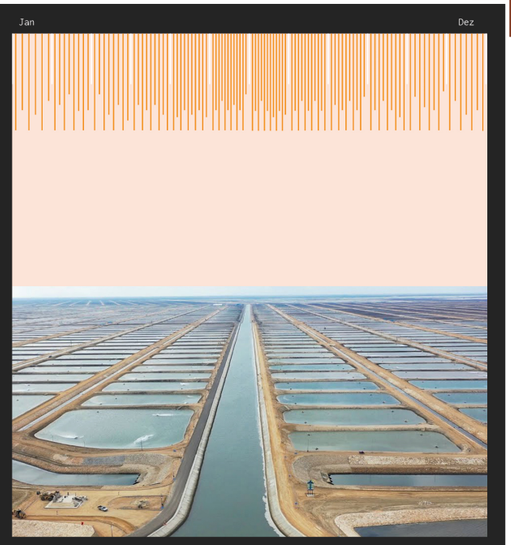
No matter what form they take, the plants are a huge contributor on dimishing biodiversity. They are unshaded pools of water, completely exposed to solar radiation. The ideal temperature of the unprotected fish cannot be maintained as a result. With high energy demands caused by constant desalination farming methods like this become more and more this form is becoming more and more cost-intensive. With rising sea levels and the simultaneous sinking of the Nile caused by dam constructions and biogas processing fighting incoming salt water won‘t be possible for much longer. The climate-induced and man-made loss of land and fertile soil has serious consequences for global flora and fauna. The Nile Delta is one of the two most important hubs for migratory birds from the European and Eurasian regions. Due to the monocultures, the birds lose resting and feeding possibilities during their migration. My design approaches are intended to be a proposal for more sustainable fish farming, which, at the same time, offers an ecological solution by increasing biodiversity.

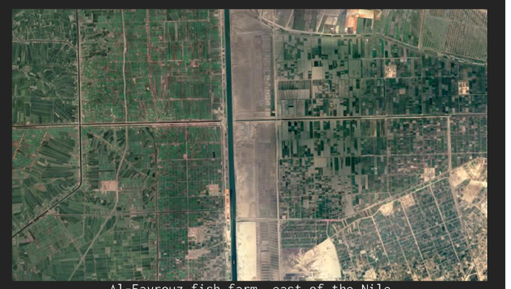



Fish farm in the west of Alexandria
Average precipitation (in 5mm) and days of rain




Floating farms in Rosetta
Average monthly min. and max. temperatures



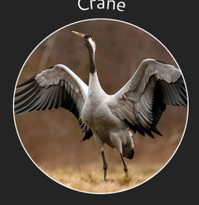

Al-Fayrouz fish farm, east of the Nile
Average hours of sunshine


Nightingale


Cuckoo


Kingfisher


Pink-Backed Pelican


Crane


Honey Buzzard


Sandgrouse


Black-Winged Stilt


Nile Tilapia
16°C–30°C


Nile Perch
16°C–25°C


Meagre
24°C– 29°C


Spotted Seabass
18°C–29°C


Hammerkop


Cattle Egret


Al-Max fisherman fixing his equiptment outside the house


Damage caused by floodings in Alexandria

Establishing a saline gradient would be a more ecologically and economically sustainable solution. Basins flooded by the sea are gradually filtered by salt-tolerant plants (halophytes). The main players here are various mangrove species. The system borrows from globally distributed mangrove forests and combines them with native plant species. Nesting grounds, feeding sites and shading are created. Native species can be reintroduced underwater, while snails and shrimp help combat algae growth underwater. They‘re also a big food source for birds.

The emerging biodiversity is also an advantage for Egypt‘s economy. Selling secondary farming products like oysters, crabs, shrimp and sponges expands the market. Meanwhile the areas will become more attractive for ecotourism and contribute to animal and plant conservation. Corals can be raised in the marine areas (26-35ppt), which counteract the nearby dying in the Zaki Reef. Animals and plants formerly considered sacred are regaining their place in the Egyptian present and are living references to Egyptian cultural history.

The fish farming methods currently practiced in and around the nile delta are all monocultures. Although they are efficient, they lead to a rapid spread of disease and parasites. Due to high water and energy costs, there is a risk of the water not circulating properly. Oxygen deficiency, excessive algae growth and dead-zoning are the result. The open fields leave no room for the establishment of biodiversity. If the establishments were to stop, e.g. for financial or ecological reasons like incoming seawater, huge fallow areas would occupy the land.

Map of Alexandria with areas flooded by 2100
due to rising sea levels