From desert sands to biofuel crops

Transforming huge swathes of land from an arid desert into lush green fields might seem unethical to some, but to others it could present a 'green' economic opportunity. With food production strained across the world and biofuel demand growing, New Nile Co representative Tamer Nassar discusses the potential of a saltwater project earmarked for Egypt

As the world's population rapidly expands, stress is being placed on global food production and supplies of fresh water.

A huge saltwater project earmarked for the mouth of the region's largest river could potentially transform large swathes of desert into one of the world's largest biofuel plantations and a food production site, without placing further strain on fresh water supplies.

An Integrated Seawater Agriculture System (ISAS) project proposal, covering some 50,000 hectares, is currently being outlined, which would use seawater to irrigate arid land.

The New Nile Co project is in its planning stages and is being proposed for an area near the mouth of the Nile River, which would reshape the landscape with a mixture of mangroves, land suitable for mass cultivation, and a natural nursery for fish and shellfish.

According to Tamer Nassar, regional vice president of New Nile Co project partners Energy Allied International, seawater irrigation is at the heart of any ISAS project and consists of a process unlike traditional freshwater agriculture.

"As in so many things dealing with nature, it is an art form that requires the application of both science and practical experience — both of which exist within New Nile Co in great abundance," remarks Nassar. "This knowledge is now widely prevalent, which is precisely why seawater agriculture is not a common practice."

Nassar claims the science behind the concept of ISAS has already been proven, and has been documented through research and development, and operational experience at the Environmental Research Laboratory at the University of Arizona, and on ISAS projects in Eritrea and Mexico.

"The Eritrea project was an operational, financial and social success until it was sadly nationalised by the local government,"



The New Nile Co project will transform swathes of desert into arable land.



The Nile is the key source of water for arable land in Egypt, as well as being a key tourist draw.

remarks Nassar. "The Mexico project is still active after several decades of operation, thus proving the sustainability of an ISAS project."

Seawater comprises 97% of the world's water resources and therefore presents a solution for fuel production, food production and afforestation, which could yield substantial benefits to countries with rising populations and limited cultivatable land.

Discussions with the Egyptian government are currently underway, reveals Energy Allied International's Nassar, with a full plan set to be in place by 2011.

If all goes to plan, construction on the project will begin in 2012, with current estimates pointing to a construction phase of between 24 to 30 months.

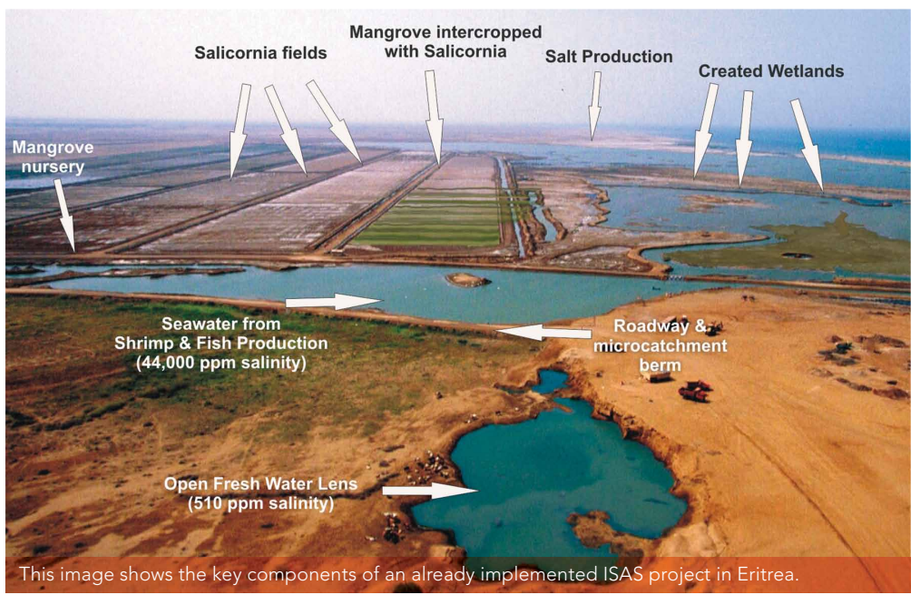
According to New Nile Co, ISAS aquaculture has a projected production ratio of 1:5 when compared with what the project team terms "general agriculture", meaning that for every hectare of aquaculture, the project will be able to irrigate five hectares of salicornia.

Nassar claims the project could produce 1.2 tons of high-grade vegetable oil from every hectare of salicornia grown, and predicts that the ISAS project on the Nile would be able to produce 650,000 tons of biofuel a year.

"This is a significant figure," remarks Nassar. "Especially when considering that this biofuel is produced from arid desert land that is otherwise entirely unproductive."

ENVIRONMENTAL BENEFITS

According to Nassar the project will be of "enormous environmental benefit".



This image shows the key components of an already implemented ISAS project in Eritrea.

"In terms of micro environmental benefits, New Nile Co will upgrade the existing ecosystem from that of being a barren, inhospitable, arid desert to one that is a green sanctuary, hospitable to humans, wildlife and plants," he notes.

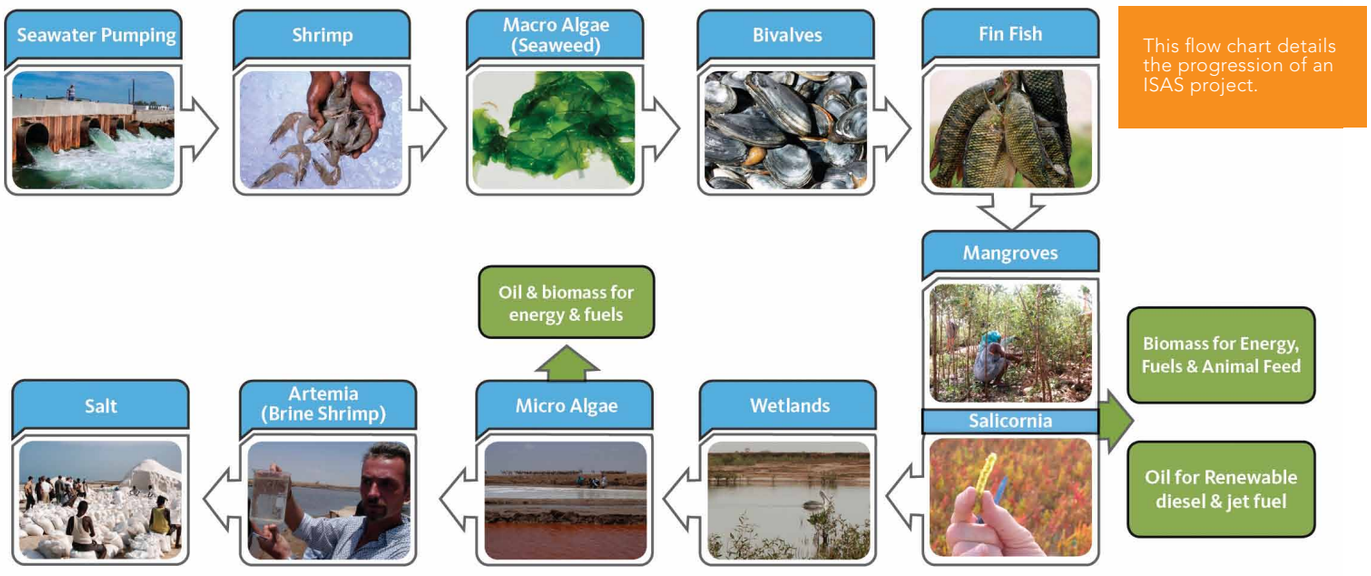
"It will enhance the soil nutrient contents of the entire project site through the practice of agriculture and aquaculture, creating an environment more suited to agricultural production, and in terms of macro environmental benefits it can offset rising sea levels by making productive use of overtly abundant untreated seawater."

Nassar argues that the project has a global role to play in cutting carbon emissions through the production of environmentally sustainable biofuels.

When quizzed on whether it is possible that transforming such a vast amount of derelict land into a new eco-system could actually end up having a negative effect on the environment, Nassar claims the project's designers are thinking ahead.

"With respect to increased carbon emissions or related activities, our in-house engineering team all been tasked with designing a project that is both environmentally responsible and sustainable," says Nassar.

"This is not an easy task," he points out. "For example, pumping seawater on to the project site in order to provide a steady flow of water to New Nile Co's seawater rivers and canals is a potentially energy-intensive exercise."



This flow chart details the progression of an ISAS project.

"We are going to great lengths to ensure that this energy can be generated in a environmentally, technically and economically sustainable manner, minimising, if not negating altogether, carbon emissions related to this aspect of the project."

Nassar claims that all environmental aspects of the project are being taken into consideration, including transportation to and from the site as it aims to operate with a carbon credit surplus.

SOCIAL PROFIT

Alongside the environmental benefits of the Nile project, New Nile Co has documented and presented its potential economic and social benefits.

An **ISAS project** is essentially an agricultural project combining untreated seawater and arid, non-agricultural grade land, which produces multiple sources of biofuels and food.
It is made up of three key components:
- Seawater: a man-made seawater river enables seawater to flow from the sea into the project area to be pumped onto the land for agricultural irrigation and other applications
- Land: large tracts of low lying uninhabited, arid desert land located inland, which will become productive through the farming of halophytes (seawater tolerant plants) and practicing aquaculture
- Labour: a sizable workforce of skilled, semi-skilled and unskilled labour is required to operate an ISAS project

"Socio-economic benefits are the primary reason why the project has received such overwhelming support from the Egyptian government at large," notes Nassar.

"With a multi-hundred million US dollar investment value, New Nile Co is presently Egypt's largest agricultural investment under development and the operation will be fully integrated, with co-located production, processing and infrastructure."

Approximately 6500 individuals will be directly employed at the 50,000ha site, says Nassar, with a further 65,000 indirect employment opportunities created through upstream and downstream services.

"New Nile Co will provide higher incomes, increase livelihood stability, reduce poverty risk, foster economic diversification, increase entrepreneurship, yield a more highly educated workforce, attract new investments and improve overall macroeconomic stability to the region where the project is to be situated," asserts Nassar.

"New Nile Co will also address critical social challenges, including urban crowding and food security, and will allow Egypt to become an exporter of solid and liquid biofuels, and seafood."

Thanks to the social and economic benefits projected by New Nile Co, it has been able to secure the support of key individuals and organisations within Egypt, despite the scale of the project.

"The Egyptian government has been wholly supportive of New Nile Co's development to date, both politically and practically," claims Nassar.

The project's leaders have been granted ministerial access and claim to have the support of key ministries within the government and local authorities.

New Nile Co has secured long-term cooperation agreements with the Agricultural Research Centre at the Egyptian Ministry of Agriculture and the Desert Development Centre at the American University in Cairo.

It is also working with the Masdar Institute of Science and Technology's Sustainable Bioenergy Research Project and has even received the support of Dr Nina Fedoroff, science and technology advisor to US Secretary of State Hillary Clinton.

REGIONAL LEGACY

The team behind the project is keen to provide a lasting legacy in the Middle East, while also addressing global environmental issues such as climate change and rising sea levels.

"There is also a great need to produce valuable products which are presently in ever-decreasing supply, such as food and biofuels, while capitalising on an abundance of otherwise unproductive natural resources such as untreated seawater and desert land," remarks Nassar.

"New Nile Co offers something for everyone, he adds, noting that the project could have a lasting educational legacy across the arid Middle East.

"Through New Nile Co's existing formal associations with the Agricultural Research Centre at the Egyptian Ministry of Agriculture and the Desert Development Centre at the American University in Cairo, we hope to be able share our knowledge and expertise with future seawater agriculturalists," he insists.

"Green, lush productive ISAS projects can eventually become a common feature of the region's otherwise generally dry and arid landscape."