

REVOLVE

HOME ART CITIES ENERGY POLITICS OPINION WATER VIEWS REPORTS
ABOUT CONTACT SUBSCRIBE TERMS SUBMIT ISSUES ARCHIVES

ADVERTISE

Thursday, February 07, 2013

Facing the Tide

Added by **Revolve** on July 28, 2012.

Saved under **WATER**

Tags: **climate change, Egypt, Nile, water**

Researchers and local community leaders are examining how to protect Egypt's Nile Delta coast from rising sea levels.

Writer: Mohammed Yahia

Share

Bassem Farhat, a young farmer in the northern town of Gamasa, stands eyeing his once-fertile land, now flooded with saline groundwater. "It is impossible to grow anything here. I have to drain and rinse the land before I have any hope of growing crops again. Then I have to protect my land from this happening again," he says bitterly.

A neighbor has switched to growing rice and introduced freshwater fish for extra income. But as salt levels in the groundwater have increased, his rice crops have begun to wilt. A fish floats dead in the briny field.



Hard adaptation measures such as this sea wall are expensive to build and require maintenance due to wave damage. Source: IDRC, Mohammed Yahia.

People settled Egypt's Nile Delta over 5,000 years ago for its fertile land and abundant fish supply. Today, it serves as the breadbasket for Egypt's population of 82 million. In 2007, the Intergovernmental Panel on Climate Change projected an average global sea-level increase of 18cm to 59cm by the end of this century. Several recent assessments suggest this figure could

be much higher. In low-lying areas such as the Nile Delta coast, sea-level rise and other climate change effects threaten food security and livelihoods. These fragile coastal regions are already struggling with the effects of erosion, pollution and ecosystem degradation.

Pinpointing the threats

Researchers from the Coastal Research Institute (CoRI) of Egypt's National Water Research Center, Alexandria University's Institute of Graduate Studies and Research, and the Center for Development Services are exploring options for adapting to the expected impacts of sea-level rise. In addition to shedding light on the likely physical effects, they are looking at how local people are vulnerable, socially and economically, and what the trade-offs will be as they choose options to adapt. Their work was supported by the Climate Change Adaptation in Africa research and capacity development program, which was launched in 2006 by Canada's International Development Research Centre and the United Kingdom's Department for International Development.

The study area includes the towns of Gamasa, Ras el-Bar and New Damietta, which are at risk due to their low elevation. The researchers measured land height along a 30-km stretch of coastline, extending 15km inland. They collected data on wave patterns, their intensity and direction, and are conducting socioeconomic studies of people living in the area. "We wanted to better understand the realities of farmers, fishermen, investors and the tourism industry," said Mahmoud el-Banna, leader of research activities in Ras el-Bar.



Gamasa's agricultural drainage system cannot deal with the rise in underground seawater, which increases the salinity of the soil and decreased the amount of crops farmers can plant. Source: IDRC, Mohammed Yahia.

Researchers have identified three main threats — flooding of the coastal regions, seawater intrusion into freshwater aquifers and rising groundwater — and mapped the predicted damage these threats could cause.

Representatives of affected communities were then brought on board through workshops on climate change and sea-level rise. "We explained what we as scientists know, and we heard their feedback," said Abu Bakr el-Sedik Abu Zeed, deputy director of CoRI. "We realized that some areas are already seeing many of the problems we predicted through our research."

The likely impacts

The town of Ezbet el-Borg, located where the Damietta branch of the Nile River flows into the Mediterranean Sea, is critical for food security in Egypt. It accounts for 60 percent of the country's fish catch. Residents started to notice a rise in sea levels 20 years ago. "We did not know the reason until scientists started talking to us," said Hossam Khalil, head of the Fishermen's Cooperative Society of Ezbet el-Borg. "In recent years, we began raising new homes built in our city to protect them from the sea. It had started flooding some of the ground-floor rooms in older buildings."

“The direction of waves is changing, which has decreased the amount of fish in our regular fishing spots,” said Khalil. “Some of the fish, such as sea bream, are slowly disappearing, while we are seeing more foreign fish species from the Red Sea as the Mediterranean waters warm up.”



Emad Khalil (left) and Araby Khalil (right) are two fishermen who stopped heading out to the sea because changes in the sea water temperature has reduced fish yields. Source: IDRC, Mohammed Yahia.

However, the potential impacts on agriculture may be the greatest threat posed by sea-level rise in the region. Wagdy el-Sewedy, deputy director of the Ministry of Agriculture in the city of Damietta, explained that rising groundwater has affected soil composition and overloaded drainage systems in several places in Damietta Governorate.

“We can't plant vegetables here anymore and we have lost most of our date palms. We can only grow rice now because of the large amount of water in the ground. But even that is becoming hard because the salt is destroying yields,” he added. Rising temperatures have also created favorable conditions for the outbreak of diseases that harm the crops.

Along the coast, vast swaths of agricultural land have become completely barren, the soil turning white and muddy from salt seepage. In northern parts of the Delta, salt levels in groundwater currently exceed 4,000 mg/l, the upper threshold for farmland and more than double the usual salt levels in the area.

“If you step onto this land, you will sink knee deep into the salty remains,” said el-Banna. “It will take lots and lots of water to rinse and make it arable again, but even that won't solve the problem.”

Looking at protection measures

The researchers have drawn up vulnerability maps for the region, using the collected data to help policymakers better understand the challenges they face. Results suggest that previous projections of flooding in the Delta were exaggerated because they ignored the natural topography of the region and the protection it offered. “In the worst-case scenario,” said el-Banna, “we expect 3 percent of the Nile Delta to be inundated by 2100. In the best-case scenario, it will be only 1 percent.” Still, some areas will be hard hit: the agricultural town of Gamasa, for example, may lose over 11 percent of its total area by the end of the century.

While most of the Delta is on low land, a narrow elevated strip along the coast acts as a natural barrier, according to CoRI's Abu Zeed. “This offers us protection. But if that line were eroded, we would have a serious problem on our hands.” While the elevated shoreline offers natural protection against flooding, it does not prevent saline water seeping up from underground. This threatens freshwater supplies in an area already experiencing water shortages.

The socioeconomic impacts would be felt by residents and non-residents. Much of the coast is being developed into luxury resorts to attract tourists to the area's beautiful beaches. “We



Lowland beaches means the water can move tens of metres inland in Ras El-Bar when the waves and tide are high in the winter time.

Data gathering has focused on erosion from waves and flooding, the degree and extent of salt-water incursion, rising groundwater levels and whether the current drainage system can handle the rising water. The challenge now, according to Abu Zeed, is coming up with options to address these problems and protect the area. The team has so far done an initial cost-benefit analysis of a range of possible measures. These include “hard” coastal defenses, such as groynes and breakwaters, and softer measures such as creating artificial dunes, improving beach drainage, or even retreating from coastal areas likely to be flooded. Each of these choices entails difficult trade-offs.

Finding solutions with community leaders

One of the chief difficulties the research team faces is communicating the imminent danger to policy-makers, many of whom think the chance of flooding is remote. But the team has enjoyed some success in involving community leaders in various sectors in the problem-solving process. “After all the discussions and presentations we made, we started to notice a shift in the perception of people living here,” said researcher Medhat Abd el-Mohsen of CoRI. “They started cooperating with us and facilitating our work.”

A 16-member climate change committee was established, to engage community representatives ranging from investors and teachers to farmers and fishermen. Sub-groups in turn communicate the problem to their local communities. Aisha el-Sayed, manager of the local education directorate, is one such committee member: “We need to explain to our people that there is a serious problem – even if we are not noticing it too badly now – and that the experts can help us deal with it,” she said.

El-Banna explained that the local communities will be particularly important during the project’s next phase. “We have gathered information on protection methods available around the world. Now, we will work with our local partners to find out which of these are applicable, taking into account the social, cultural and economic realities so that the solutions we agree on are relevant.”

“We need a concerted effort to address this serious problem,” said Mohammed el-Zeeny, a local investor in New Damietta. “We cannot wait until it all comes crashing down on us. We are all affected by climate change – from the smallest farmer and fisherman to our scientists – and need to work together to find solutions that will save our region and our country.”

*Mohammed Yahia is the editor of **Nature Middle East**.*

*This article was written for the Climate Change Adaptation in Africa research and capacity development program, which was launched in 2006 as a joint initiative of Canada’s International Development Research Centre (IDRC) and the United Kingdom’s Department