Carp Aquaculture Overwhelms Lake Kolleru Andhra Pradesh, India

Thematic Focus: Resource Efficiency, Environmental Governance and Ecosystem Management

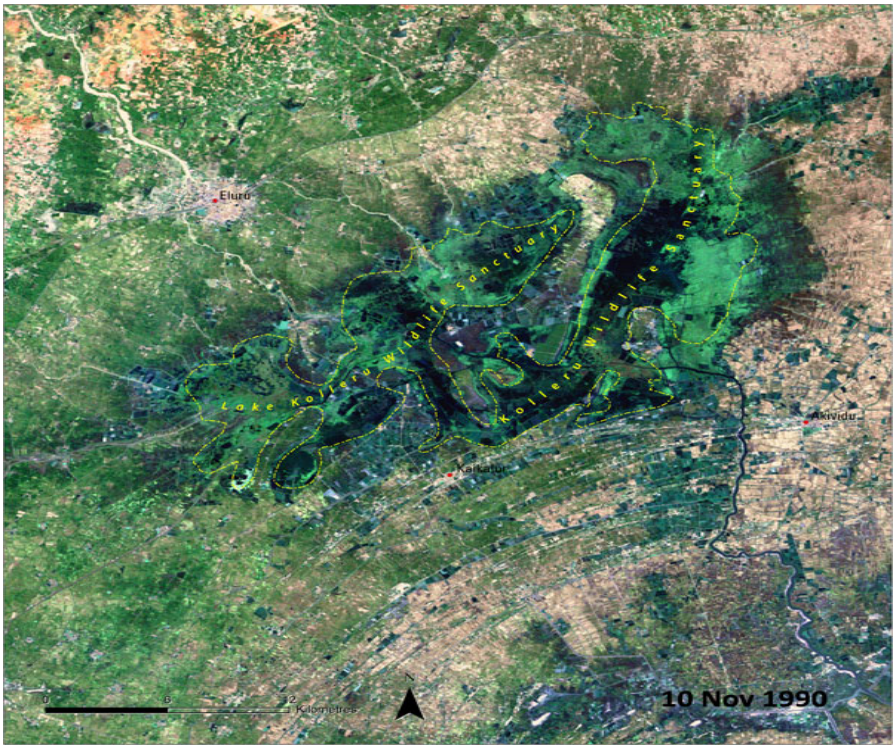
Why is this issue important?

Lake Kolleru Wildlife Sanctuary, a vast shallow wetland habitat, is the sole Ramsar-designated wetland in Andhra Pradesh, India (Ramsar 2002, FAO 2006). It serves as a natural flood-balancing reservoir between the deltas of the Krishna and Godavari Rivers (Nagabhatla and others 2009) and is a source of water for domestic use and irrigation (Venot and others 2008). In spite of its protected status the wetland is under threat.

In 1990, the principal land use and livelihood around the lake was paddy agriculture (Figures 1990 and 3a) (Rao and others 2004). Kolleru also traditionally supported a substantial fishery (Ramsar 2002). In the 1990s, commercial aquaculture rapidly expanded in and around Lake Kolleru. A unique, semi-intensive system described as "Kolleru carp culture" developed, and by 2002, was producing 90 per cent of the state's 600 000 metric tonnes of carp (Ramakrishna 2007).

Hotspot Image Viewer: 1990, 2004 and 2010

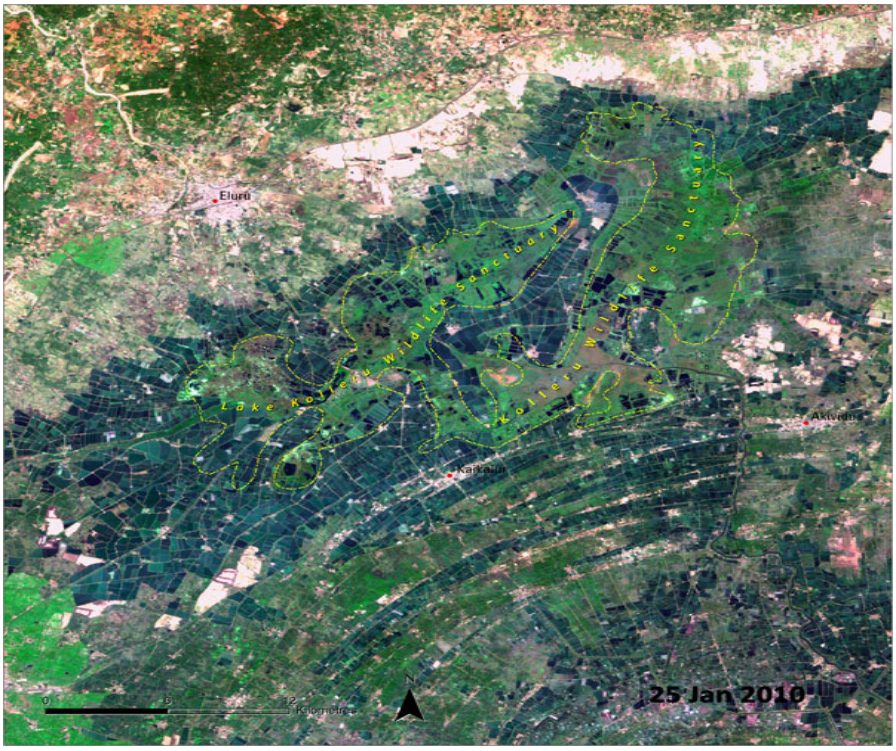
LEFT IMAGE 10 Nov 1990 RIGHT IMAGE 25 Jan 2010



Instructions

Compare different satellite images for this Hotspot by selecting different "Left" and "Right" images.

Use the slider located in the middle of the images to change the viewing area for each image.



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By 2004, the lake had over 1 000 fish ponds covering more than 40 per cent of the lake, (Figures 2004 and 3b) while the remaining surface was either covered by dense weeds or paddy-rice cultivation (Rao and others 2008).

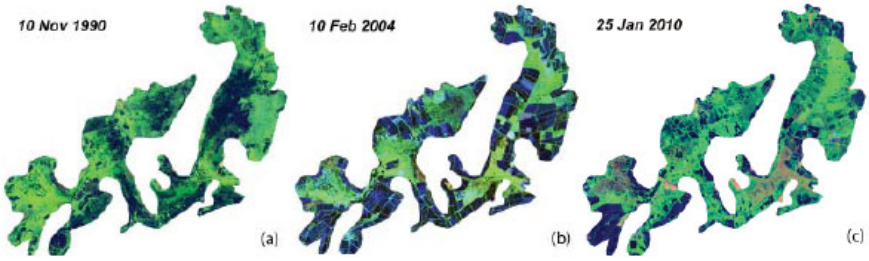

Figure 3a-3c: Landsat images clipped to the boundary of the wildlife sanctuary show the aquaculture encroachment (rectangular blue areas) peaking around 2004.

A growing population and increasingly intense land use in the area surrounding the lake led to the rise in polluting inputs, including industrial effluents, pesticides and fertilizers from aquaculture, and agriculture and domestic sewage (Venot and others 2008, Adhikari and others 2009).

The Andhra Pradesh government mandated a program to improve the lake's condition, ordering unauthorized fish ponds to be demolished (Ramakrishna 2007). Many of the carp aquaculture enclosures located within the protected area were breached in 2005 and 2006 using explosives (Rao and others 2008).

What are the findings and implications?

While the government programme reduced the intensity of aquaculture within the protected area, some ponds remain (Figures 3c, Figure 2010 and 5) and there are signs that illegal ponds are returning to the sanctuary. Where ponds were breached, in many cases much of the enclosure remains and continues to alter the hydrological and ecological functions of these areas (Rao and others 2008). In addition, the surrounding area between the Godavari and Krishna deltas is seeing continued expansion and intensity of aquaculture (Figure 2010). Water quality continues to be threatened as industry, agriculture, and aquaculture activity discharges large amounts of major nutrients, trace metals, and pesticides into the lake (Adhikari and others 2009). This

example shows the danger of sacrificing many undervalued ecosystem services provided by wetlands (such as flood regulation and wildlife habitat) to obtain marketable goods in the short term. It also provides a cautionary lesson: improving management and regulations can reverse the worst impacts but implementing policies beforehand would prevent them.

Figure 5: High resolution satellite data from late 2009 shows the intensity and proximity of ongoing aquaculture to the sanctuary.

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- 10 Nov 1990
- 09 Jan 2004
- 25 Jan 2010

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