

## Basin Profile: Godavari River Basin

Original Report By: Koren Manning, University of Virginia

Profile Prepared By: Laura Szczyrba

### Water Scarcity Status

- Dams on the Godavari have intercepted the flow of sediment to the coast, causing coastal and delta erosion that puts groundwater at risk for seawater intrusion and threatening agricultural production in the area.
- The Godavari is a holy river. It features prominently in religious traditions as a site of the Kumbh Mela – one of the most significant Hindu holidays - when bathing in its waters brings spiritual cleansing.
- The lack of treatment for human sewage is the largest threat to water quality for the Godavari (Only about 9% of rural homes and 24% of all homes in India have flushing toilets).
- According to the Andhra Pradesh Irrigation and Command Area Development Department, the state will need 73% more water by 2025

### Basin Overview

South Indian Peninsula

Area: 319,810 square kilometers

Climate: Monsoonal

Basin population: 64,500,000



Figure 1. Map of Godavari River Basin (<http://free-stock-illustration.com/godavari+river+india+map>)

The Godavari River is the second longest river in India, at 1,465km (910 miles). It runs west to east across central India, with the headwaters in Maharashtra (the westernmost point in the basin lies less than 100km from the western coast along the Arabian Sea), and its outlet into the Bay of Bengal located in Andhra Pradesh. The basin covers portions of six states in total. The mainstem flows through two states: Maharashtra and Andhra Pradesh, while the catchment area includes four others: Madhya Pradesh, Orissa, Karnataka, and Chhattisgarh.

The Godavari River is fed by the annual monsoons which come in late summer. In fact, 90% of annual precipitation is received between July and September. This outpouring from the sky provides crucial water resources; however, the seasonal variability presents challenges in managing year-round water needs. This challenge has been met through the creation of numerous dams along the river which allow water to be stored in reservoirs for use during the dry season.

The largest city in the basin is Nagpur, located in Maharashtra, with nearly 5 million residents. Other major cities include Rajahmundry, Kakinada, Nasik and Nanded. The population density throughout the basin averages 202 people per square kilometer (523p/square mile). While this figure is quite high compared to a river in urban areas of the US, the rate is similar to Europe and significantly lower than Ganges basin. The Godavari plays a central role in Hindu cosmology. It is the site of two important religious festivals – Pushkaram and the Kumbh Mela – both of which bring millions of pilgrims to bathe in the holy water of the river.

There are seventeen dams over 15 meters (50 feet) high in the Godavari basin, five of which are on the main stem. There are no dams above 150 meters (500 feet). A sizable dam is the Upper Wainganga Dam in Madhya Pradesh, constructed in 1995. The reservoir of the Upper Wainganga is the largest surface reservoir in India with capacity of 50km<sup>3</sup>. The dam provides 3450 kW hydropower as well as irrigation for 105,253 hectares and domestic water supply. India has recently embarked on a large-scale National River-Linking Project, which was approved and made public by the central government in 2002 (though some form of this plan had been discussed since the 1970's). The goal of the project is to increase the nation's food production capacity. This will be accomplished by providing additional water supplies. This project has two major components – a Himalayan component linking rivers in the Ganges basin, and a Peninsular component linking rivers throughout the south.

India has no formal legal framework for granting water rights. According to the Constitution, states are authorized to control surface water within their territory. The central government is tasked with managing inter-state waters and resolving disputes. Meanwhile property owners are indirectly considered to control the groundwater beneath their land. For this reason, public authorities typically manage canals and irrigation projects while farmers or local private entities independently control groundwater. At the national level, water issues often fall into the purview of the Ministry of Water Resources, which includes the National Water Development Agency responsible for the River Inter-Linking project.

While India's economy has grown rapidly in recent decades, living standards continue to lag, with the majority of residents living in poverty. Agriculture continues to be a major component of India's economy. The agricultural sector accounts for 19% of GDP yet engages 52% of the work force. This suggests low agricultural productivity. One factor potentially affecting productivity is farm size. The average farm in India is 3.3 acres. Despite low productivity, India's agricultural sector is massive. India has the largest internal blue water footprint of any country in the world, largely due to irrigating wheat, rice and sugarcane. These agricultural outputs have an impact beyond the country's borders, as a large portion of this virtual water is eventually exported. India is the third largest exporter of virtual water, following the US and China. The Godavari delta is known as the "rice-bowl of India" for its prolific output of this staple grain. Rice is the largest crop of the region both by growing area and water usage.

## **Water Scarcity Impacts**

### Environmental Impacts

High levels of coliform and high biochemical oxygen demand have severely degraded the Godavari River. Besides these water quality impacts, the delta region has suffered ecological damage in recent decades, through the loss of mangrove forests and lack of sediment due to dams on the river channel.

The Godavari delta is home to the second largest mangrove forest on India's east coast (at a size of 332 km<sup>2</sup>). The forest has traditionally provided habitat for a large number of fish and shellfish, as well as fishing grounds, protection from cyclones and coastal storms, and wood from the mangrove trees for fuel and building material. However, much of the original mangrove forest has been lost due to deforestation in the search for fuel, as well as in conversions to agricultural land and aquaculture ponds. According to one study, using satellite imaging to analyze land cover changes, the area lost 24.6 km<sup>2</sup> of mangrove forest between 1977-88. The Coringa Wildlife Sanctuary, established in 1978 in the Godavari delta region, protects a large mangrove forest and provides nesting habitat for the endangered Olive Ridley sea turtle from January to March.

A serious ecological impact is the decline in the amount of sediment delivered to the delta due to damming. Delta regions rely on sediment carried from upstream to maintain their shoreline. When dams block this sediment it can

cause erosion and loss of shoreline. A recent study of the Godavari and Krishna basins found significant decline in sediment load and erosion of the sea level since the dam construction era which began in the 1960's. Sediment load at the outlet of the Godavari has experienced a three-fold decline in past decades from an annual average load of 150 million tons from 1970-79 to an annual average of 57 million tons from 2000-2006.

### Economic and Social Impacts

Water resources are a crucial issue in the separatist Telangana movement. The Telangana region is one of three regions in the state of Andhra Pradesh (the others being coastal Andhra and Rayalaseema). The region is engaged in negotiations to separate from Andhra to become an independent state. One of the central grievances of the Telangana region is their claim that water has not been allocated fairly, and that their allocation should be greater. The government has given conditional approval to the separation though no final resolution has been reached on the specific framework or timeline.

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