



Connected Component Segmentation for the extraction of Aquaculture ponds along India Coast using time series Sentinel-1 SAR data

Arun Prasad Kumar (1), Marco Ottinger (2), Kersten Clauss (2), Patrick Leinenkugel (1), and Claudia Kuenzer (1)
(1) Deutsche Fernerkundungsdatenzentrum (DFD), Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR), Coasts and River Basins Team, Land Surface Department, Wessling, Germany (karunprasad.gis@gmail.com), (2) Department of Remote Sensing, Institute of Geography and Geology, University of Wuerzburg, D-97074 Wuerzburg, Germany

Aquaculture is one of the fast growing primary production sectors in India which experienced an exponential growth in production from 0.75 million tons in 1950 to 9.6 million tons in 2014. India has got a vast long coastline of 7,517 km and currently the second largest country in fisheries production. As per the UN FAO Report on National Aquaculture Sector Overview in India (2014), small scale farmers along nine coastal provinces alone contribute 90 percent of the total shrimp production mostly in small dedicated ponds along the coastal wetlands. This development has led to the large scale conversion of coastal wetlands such as mangroves, swamps, lagoons and coastal lakes. In this research, we tried to extract aquaculture ponds using time series high-resolution Sentinel-1 SAR data for the time period of September 2014 to June 2017. The buffer zone of 200km along the coastline of India was selected for our study. The elevation data from SRTM DEM data and slope calculated from that were used for terrain masking whereas the standardized coastline data was used to create a land-ocean mask. More than 3,000 aquaculture pond vector samples were collected and used for the calculation of shape metrics. Pre-processed Sentinel-1 time series data available within the Google Earth Engine were used to calculate a temporal median image for the whole study area. Open-source connected component segmentation algorithm was for the identification of ponds based on the difference in backscatter intensity of inundated surface and shape metrics calculated as input parameters for segmentation. After several iterations by giving range of inputs, we could extract the aquaculture ponds for the study zone. A quantitative analysis was done to determine the provincial dominance in aquaculture production and associated conversion of wetlands. Andhra Pradesh and Gujarat holds major share of the shrimp production through aquaculture ponds.