



Ecological Benefits of Growing Fisheries: Ground Water Recharge at Purba Medinipur District, West Bengal

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Received: 20 May 2020; Revised accepted: 19 October 2020

ABSTRACT

About 69% of the Indian populations are living in rural area where the source of drinking water is ground water. Presently a major portion of the rural peoples are also using ground water for their domestic and agricultural uses either by own pumping system or by public water supplying systems. Though the megacity water management systems use river or lake water for domestic or industrial uses however, small towns and municipalities are mainly depending on ground water as they don't have any water purification systems. As a result, the ground water level is decreasing very fast in most of the states in India. Therefore, ground water recharge is necessary for sustainable ground water management with social development. Presently fish farming is a very fast-growing business at Purba Medinipur district in the state of West Bengal. Considering the economic benefits of fish farming in comparison to agricultural products, peoples are converting their lands to wetlands. These fisheries wetlands benefitted the sustainable ground water management systems by improving the ground water recharge process mainly for the four reasons: (i) high perimeter to volume ratio, (ii) long time water reserves though out the year (iii) ground soil permeability improvement in each year and (iv) water pressure (about 3 metre height) on soil.

Key words: Ecological benefits, Fish farming, wetland, Ground water recharge, Purba Medinipur

Globalization is a very much popular word in present days. This globalization becomes feasible with the development of transportation systems. With the improvement of transportation facilities, the small-scale industries such as farming, small production industries are also growing rapidly. Among these small production industries, fish farming is an important sector for supplying huge demands of fishes. Fish farming is a very fast-growing production industries and number of fisheries is rising sharply at Purba Medinipur district in the state of West Bengal (Fig 1) (Dutta *et al.* 2016). A recent report says that a huge portion of paddy plant field are converted to prawn and shrimp fisheries at all the blocks of Purba Medinipur district (Giri 2018). Herein we are going to discuss how such fisheries benefitting our ecological process ground water recharging.

Ground water pumping is the only source of drinking and domestic water used in rural and semi urban areas. UNESCO report says that uncontrolled pumping of ground water gradually lowering the ground water level (Suhag 2016). If the ground water recharge process becomes slower than pumping out, then the day will be not so far where most of the existing pumping stations will fail. Now a day the development of society becomes almost equivalent to the violation of ecosystem. The conversion of cultivation land to fisheries is degrading the soil chemistry however, it also helping our ecosystem by recharging the ground water.

What is ground water recharge?

Ground water recharge is a hydrologic process where the surface water moves towards ground water to maintain the hydrological cycle.

Why the ground water recharge is important?

About 69% of the Indian populations are living in rural area where the source of drinking water is ground water. Presently a major portion of the rural peoples are also using ground water for their domestic and agricultural uses either

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by own pumping system or by public water supplying systems. Though the megacity water management systems use river or lake water for domestic or industrial uses however, small towns and municipalities are mainly depending on ground water as they don't have any water purification systems. The ground water level is decreasing very fast in most of the states in India due to the explosion of population growth along with development (Census of India 2007). Therefore, ground water recharge is necessary for sustainable ground water management with social development.



Location of West Bengal in India map



Location of purba Medinipur in West Bengal

Ground water recharge procedure

Ground water recharge occurs both naturally as well as artificially. Naturally ground water recharge occurs by rain, snow melt, rivers and lakes. Natural recharge process is impeded to some extent by human activities such as development, paving etc. Artificial recharge of ground water is becoming more and more important in India due to over pumping of ground water. Indian government have allocated rupees 1800 crore in 2018 to fund dug-well recharge projects according to the recommendations by international water management institute (www.indiawaterportal.org).

Our observation

Inland wetlands play an important role in ground water

recharge process. The extent of ground water recharge by wetland mainly depends on soil texture and composition, water table gradient, vegetation, time period of wetland in a year and perimeter to wetland volume ratio (<https://doi.org/10.1016/C2014-0-01944-2>). Among these parameters the last three are little related with the human activities. The texture and composition of soil under most wetlands are relatively impermeable and therefore the ground water recharge occurs through the soil minerals present in wetland edges. Therefore, higher the perimeter to volume ratio, more will be the recharges. If a wetland contains water in a particular season, then water recharge will occur in that seasons only. Therefore, when a wetland contains water throughout the year then ground water recharge occurs in a continuous way. One more point is that more the height of water layer in wetlands will have more pressure on soil which will pressurize for water penetration through soil.

At present the number of inland fisheries is sharply growing at Purba Medinipur district in West Bengal for the cultivation of various types of fishes. A recent report says that Bengal's largest fisheries hub is growing up at Moyna in Purba Medinipur district (www.uniindia.com). The size of these fisheries is about 3 metre depth with variable area from few square meters to few thousand square meter surface area depending upon the economic status of the owners. These fisheries contain water for about 10-11 months in a year and clays of these fisheries are removed in each year which improves the permeability of ground soil also for ground water recharge.

CONCLUSION

Therefore, in conclusions we can say that these fisheries wetlands benefitted the sustainable ground water management systems by improving the ground water recharge process mainly for the four reasons: (i) high perimeter to volume ratio, (ii) long time water reserves though out the year (iii) ground soil permeability improvement in each year and (iv) water pressure (about 3 metre height) on soil. Finally, we can expect that these fisheries wetlands will eliminate the requirement of artificial dug-well recharge projects for ground water sustainability at Purba Medinipur district of West Bengal.

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