# INFLUENCE OF AGRICULTURAL ACTIVITIES ON GROUND WATER

**Dr. Rashmi A. Jachak**
Assistant Professor in Botany,
S. K. Porwal College,
Kamptee, (Nagpur M.S.)

---

**Introduction:-**

'Water is life' and earth cover approximately 70% water. Coincidently our body also made up of 70% water. But unfortunately out of 70% available water only a small i.e. 0.37% of is usable by human. Water is a naturally occurring important cycle of the system, containing living as well as non- living, organic, inorganic, insoluble substances (Mankar and Ingole, 2012).The water through surface and groundwater resources has become critical.Limnology is branch of biological productivity of inland water with all the causal influences which determine it (Welch 1948).In India many times there is excess of rainwater or many times there is scarcity of water. Area around 54% stress under the surface water faced by country per annum.As the major portion of agriculture in India is fully dependent on rainwater, the water stress plays very important role in determination of yield of agricultural crop and the health of agriculture (Padghan, 2012). The urban and rural areas in Metropolitan area (NMA) have been experiencing acute seasonal water stress in recent years. The time has come when all stakeholders must take cognizance for water conservation. The fresh water demand has increased drastically in the cities but the water resources are limited. Now it is the high time when the administration must check the ground water extraction to avoid any type of conflict.

Any modification in the natural quality may disturb the equilibrium system.Reservoir are important in surface water run-off for the requirement of various purposes as drinking,domestic,agricultural and industrial uses (Bharambe, 2012). Due to vast industrialization there is a progressive degradation in the quality of water. The conservation of water system is one of the severe problems to environmentalist. Out of the total water availability, hardly 1% of the global water reserve is available in the form of fresh water for direct use (Deshmukh,2012). For agroecosystem we need water at every Kharif and Rabi crops. The good quality water has the potential to allow the maximum yield under good soil water management practices. Due to poor water quality soil and cropping problems develop which ultimately reduces the crop yield and deteriorating soil properties (Raphade and Kakde ,2012).

Ground water is gift of nature and is about 210 billion $M_3$ including recharge through infiltration seepage and vapour transpiration. It comes from spring shallow wells and deep wells. It acts as a reservoirby virtue of large space in earth materials as a conduct which improves water quality by removing suspended solids and bacterial contamination. (Nagpurkar and Ingole, 2012).Groundwater flows through compressed gravel and soil

deposits and infiltration is considered to be pure than the surface water (Raphade and Kakde,2012).The disposal of agricultural waste and untreated sewage into water bodies adversely affect the plant and animal life. (Bharambe ,2012).Ground water and surface water when reacts with solid sedimentary rock, soil polluted materials they attain their chemical characteristics by chemical reaction. It is one of the poorly managed resources which upon contact with the soil, human beings and animals etc.

**Water Pollution Due to Agricultural Activities:-**

The agricultural diffuse pollution sources in integrated water quality management has been increasing concentration of nitrates and pesticides recently. In India agriculture and rural habitats are still dominant. So impact of the pollution is directly on water parameters (Agrawal,2016). The soil, the rain water becomes surface and after soaking in it may be called groundwater.The water runoff from agricultural land pollutes lakes and streams causing eutrophication. Agriculture itself is likely to be affected by non- agricultural sources of pollution. Nitrate in groundwater originates primarily from fertilisers, insecticides, pesticides. Nitrate is thus the nitrogen exposed to loss by leaching. Pesticides and fertilisers used in agriculture can contaminated both groundwater and surface water as can organic livestock wastes, antibiotics, silage effluents and processing wastes from plantation crops. (water action decade, 2017).

The high levels of nitrate nitrogen content in the surface water results in pollution of water bodies and in drinking water has been found to cause methaemoglobinaemia in infants (Blue baby syndrome), Human gastriccancer and endosuphan problem. It directly deteriorates the soil organisms. Rise in the concentration of nitrate ions in ground water has been observed in a number of countries the world over and is a cause of concern to health authorities ( Dhaliwal and kler,1995) . Due to intensive use of nitrogenous fertilizers the level of nitrates in ground water increases. The values of nitrate in the well waters of cultivated area were higher than average contents of 3.52, 4.40 and 26.40 mg/ in rain, tube well and dug well waters respectively. In above all areas 1000mg/l even more than this nitrogenous concentration has been found. According to WHO's the safe limits for potable water is only 45mg/l of nitrate is recommended.

The enrichment of with nitrogen and phosphorus causes an increase in growth of algae (Algal Bloom)i.e other aquatic weeds, which choke the water ways making water turbid and unpotable. As the producers of the pond ecosystem die, toxins are produced. The decomposing organic matter reduces oxygen content in water which may cause the death of all successive consumers and carnivores of the aquatic ecosystems.The habitats for other marine life, biodiversity, fish stocks, spawning areas for economically valuable fish and tourist attraction are decreasing due to poisonous and odorous coastal. The unsafe use of non-conventional sources of water especially waste water in agricultural sector can lead to the accumulation of microbiological and chemical pollutants in crops, livestock and products and soil and water resources and ultimately to severe impacts among exposed food consumers and farm workers: it may also exacerbate antimicrobial resistance.The water pollution from and to agriculture (Water action decads,2017). The main causes of agricultural Pollution-

Pesticides and fertilizers (Nitrates and Chlorine), pests and weeds, contaminated water, Soil erosion and sedimentation, Live stock, salts, aquifer depletion and Agricultural Policy.

**Water monitoring standards:-**

Standard method in the monitoring arePhysico-chemical and biological parameters. The water quality and surveillance in most developing countries is inadequate to test water resources and to classifythem regularly. This is due to widely spread water sources and resources crunch. The reservoir water is rarely pure since it contains different matter including gases. (Omer, 2019: David abino,2012)

**Types of Water Parameters:-**

- **Physical parameters:-** It includes Transparency, Turbidity, Temperature, Color, Taste and odour.
- **Chemical parameters:-** pH, Acidity, Alkalinity, Chloride, Toxic Substances COD BOD,TDS, Dissolved oxygen, Nitrogen, Copper, Zincand Fluoride
- **Biological Parameters:-** Bacteria, Algae, Viruses, Protozoa, Pathogens
- **Radiological Parameters:-**

**Table A Physical parameter (ISI, New Delhi)**

| **Parameter** | **Admissible range** |
|---|---|
| Transperency, | ≥1 |
| Turbidity, | 5-10 |
| Temperature, | 5 to 25 |
| Color, | 5-10 Hazen unit, max |
| Taste | Tasteless (agreeable) |
| odour | 10 (Unobjectionable) |

**Table B Chemical Parameter**

| **Parameter** | **Admissible Range** |
|---|---|
| pH | 6.5-8.5 |
| Alkalinity | 600 mg/l |
| Chlorid | 200-1000mg/l |
| TDS | <100-1500mg/l |
| BOD | 5mg/l |
| Dissolved oxygen | 4-6mg/l |
| Nitrogen | 50mg/l |
| Cu | 1-1.5mg/l |
| Zn | 15mg/l |
| Cd | 0.003mg/l |
| Total Hardness | 300 |
| **Pesticides** | |

| | |
|---|---|
| Nitrates | 20(45)mg/l |
| nitrite | 3 mg/l |
| Alachlar | 20µg/l |
| Atrazine | 2 µg/l |
| Aldrin/dieldrin | 0.03 µg/l |
| alphaHCH | 0.01 µg/l |
| Beta HCH | 0.04 µg/l |
| Butachlor | 125 µg/l |
| Endosulfan | 0.44 µg/l |
| Malathion | 190 µg/l |
| Chloropyriphos | 30 µg/l |
| Methyl parathion | 0.3 µg/l |

**Table C- Biological Parameter**

| **Parameter** | | |
|---|---|---|
| **i. Bacteriological aspects** | | |
| Coliforms | Facecalgp | E. coli |
| | Non faecal | Klebsiellaaersogens |
| | Faecal strptococci | Recent faecal pollution |
| | Closteridiumperfxinges | Remote infection |
| **ii. Virological aspects** | | |
| Cl2- 0.5 mg/l, 30min, pH-8 | | |
| O3- 0.2-0.4 mg/l, 4min | | |
| **iii. Biological aspects** | | |
| Protozoa | E. coli, histolytica, giardia, balantidium | |
| Helminths | | |
| Free living organisms | Algae, fungi | |

**Table D- Radiological aspects**

| | |
|---|---|
| Somatic, Heredity | |
| Stochastic effect | Carcinogensis |
| Non- stochastic effect | severity |

**Water Management: Future line of work:-**

Hydrosphere is one of the most important factor for the sustainable development of the life on the earth.Although considerable work has been done on the limnologic studies on some tanks, ponds, rivers, lakes, water reservoirs of country and concluded that due to unplanned urbanisation, population expansion and increase in density overexploitation for various purposes (Bhalkar, 2012).The various reducing or control technologies of agricultural water pollution are-

- Reducing leaching and erosion of fertilizers
- Use of Technologies for safe use of polluted water in Agriculture.
- Optimum use of pesticidesin agroecosystem practices
- Remedial options for polluted water
- Use of Saline water in agriculture
- Irrigation practice and extent of irrigation
- Limited Application of the chemical fertilizers

Use and Study of Water ecosystem with reference to indicators of organic pollutions, bacteriological Pollution, Indicator of suspended matter and Common ions and salinity indicators.

**Conclusion:-**

The studysuggested that there were many other small and medium reservoirs, which could serve for meeting the water demands and need for broader consideration of upstream-downstream areas and the range of water users across different sectors. Further research also needs to be conducted and recommended to determine water management policy, rain water harvesting and transparent monitoring system. Theagronomists, hydrologists and agricultural scientist need to introduce drought-resistant crop varieties that can perform well under warmer conditions.

**References:-**


- Agrawal, G. D (1999). Diffuse agricultural water pollution in India. Wat.Sci tech. Vol. 39 (3).33-47.
- Bharambe, C. M. (2012). Water quality studies on Nalagana reservoir Buldhana District, Maharashtra. 225.Proceedings of National conference on Innovative Research trends in Biological sciences. ISBN- 978-81-923821-0-6
- Bhatkar, N. V. (2012). Studies on water quality status of Hanumansagar Dam on the river wan at wari(Bhairawgad) in Akola District (M. S.).282. Proceedings of National conference on Innovative Research trends in Biological sciences. 222. ISBN- 978-81-923821-0-6
- David Abino (2012). Drinking wter quality. Slide share.
- Dhaliwal, G.S. and Kler, D.S. (1995).Principles of Agricutural ecology.Himalya Publishing house, Bombay.First edition.
- Deshmukh, P. J. (2012). Physico-chemical studies of fresh water of Kapsilake. 213Proceedings of National conference on Innovative Research trends in Biological sciences. ISBN- 978-81-923821-0-6
- Indian standard.Specialization for drinking water. ISI, New Delhi.
- Mankar, R. N and Ingole, S. P. (2012).Comparative study of characterization of two different lakes of Nagpur city (Sakkardara lake and Shanti nagar lake) 248.Proceedings

of National conference on Innovative Research trends in Biological sciences. 222. ISBN- 978-81-923821-0-6

- Nagpurkar ,A. G. and Ingole, S. P. (2012). Physico-chemical analysis of groundwater in Amravati city (Maharashtra). 298. Proceedings of National conference on Innovative Research trends in Biological sciences. ISBN- 978-81-923821-0-6
- Padghan A.V. Mahalle, N.S. and Devhadle, S. K. (2012).Study of water and nutrient stresses in the plant using fluroesence kinetics.Proceedings of National conference on Innovative Research trends in Biological sciences. 222. ISBN- 978-81-923821-0-6
- Pathak H, Bhatt, B. P and Gupta, S. K. (2016). State Indian agriculture water. National academy of agricultural sciences, New Delhi.Water pollution and agriculture chapter-4.
- Rephade, s. B. and KakdeAruna (2012). Studies on quality assessment of well water and its sutability for irrigate In Haveli Tahsil Pune District. 292. Proceedings of National conference on Innovative Research trends in Biological sciences. 222. ISBN-978-81-923821-0-6
- W. H. O report (1971). International standard for drinking water.World Health organisation. Geneva.
- Water action decads 2018-2028 ( 9 dec. 2017).
- Welch, E.B. P., Sturtevant and M. A. Peerkins (1978). Hydrobiology 57, 209-215.