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A study of issue of Water logging and salinity

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Abstract
Waterlogging and salt are two important issues that have a negative impact on agricultural production as well as the total productivity of land in the Rohtak district, which is situated in the Haryana state of India. The collection of an excessive amount of water in the soil is known as waterlogging. This condition makes it challenging for crops to mature and may also result in soil erosion and the loss of nutrients. The lack of sufficient drainage infrastructure and the overexploitation of groundwater are the primary contributors to waterlogging in Rohtak. On the other side, salinity is brought about when there is a buildup of salts in the soil. Due to the fact that groundwater, which is often high in salt content, is used for irrigation in Rohtak, this issue has reached an especially severe level there. In addition, the situation is made worse by irrigation water that is of low quality and drainage systems that are insufficient. Both waterlogging and salinity may have a detrimental effect on the production of crops as well as the overall health of the soil. It is essential to put in place improved water management methods and drainage systems if one want to solve the aforementioned problems. This involves encouraging the use of effective irrigation systems and lowering the amount of groundwater that is used, in addition to increasing the fertility of the soil via the use of organic matter and the right fertilisers. In addition, the selection of crops and rotation of those crops are two more things that may assist alleviate the consequences of waterlogging and salt.

Keywords : Groundwater depletion , Soil compaction, Nutrient imbalance, Crop failure, Soil salinization

Introduction
The district of Rohtak is located inside the state of Haryana in India. It is well-known for its agricultural output, particularly of staple foods like wheat, rice, and mustard. However, there are a number of obstacles, such as waterlogging and salinity, that the area must overcome, which both hinder the productivity of its agricultural and threaten its long-term viability. Waterlogging happens when the soil absorbs so much water that it becomes saturated. This results in decreased soil aeration and availability of nutrients, both of which may have a detrimental effect on crop development and production. Waterlogging in Rohtak is mostly the result of insufficient drainage infrastructure and excessive groundwater usage, both of which have contributed to a reduction in the level of the water table. In addition to salinity being one of the most significant issues facing Rohtak's agricultural areas, inadequate drainage systems and the use of salty groundwater for irrigation are other contributing factors. These two factors have generated a buildup of salts in the soil, which has led to salinity. This may lead to the

deterioration of the soil as well as an imbalance of the nutrients in the soil, which will eventually result in lower crop output and quality. These issues constitute a significant danger to the viability of agriculture in Rohtak and to the means of subsistence that it provides for local farmers. To address them effectively requires taking a comprehensive approach that incorporates more efficient management of groundwater resources, the implementation of environmentally friendly irrigation methods, enhancements to the quality of the soil, and the construction of drainage systems that are reliable. In Rohtak, minimising the consequences of waterlogging and salinity may be accomplished in large part via the cultivation of salt-resistant crop varieties, as well as through the installation of soil testing and analysis procedures.

The impacts of waterlogging and salinity in Rohtak transcend beyond the scope of the agricultural industry and have repercussions not just for society but also for the economy. The majority of people in Rohtak rely on agriculture as their primary means of subsistence; nevertheless, the effect of these issues on crop yields and quality may lead to diminished revenues for farmers and the families they support. In addition, waterlogging and salinity may lead to decreased food production and availability, both of which can result in food poverty and nutritional deficiency. This may have an effect on the health and well-being of the local community over the long run, particularly on children and other vulnerable groups of people. In addition to these issues, waterlogging and salinity may also have negative effects on the surrounding ecosystem, including the deterioration and erosion of the soil, the contamination of the water, and the loss of biodiversity. Consequently, it is essential to find solutions to these problems not only to ensure the long-term viability of agriculture in Rohtak but also to ensure the health and prosperity of the environment and the inhabitants in the area. The implementation of numerous government schemes and programmes in Rohtak has been a part of ongoing efforts to address waterlogging and salinity in the region. Some examples of these schemes and programmes include the National Watershed Development Project for Rainfed Areas and the Pradhan Mantri Krishi Sinchai Yojana. However, in order to produce sustainable and long-lasting solutions, these projects need the ongoing support and engagement of farmers, local communities, and other stakeholders.

In order to combat waterlogging and salinity in Rohtak, it is necessary to place more emphasis on water management practises. These practises should include the collection of rainwater and the development of more effective irrigation methods. “This will help reduce reliance on groundwater and increase the effectiveness of water use. It is possible to reduce the impacts of salinity and nutrient imbalance by enhancing the health of the soil via the addition of organic matter and the use of suitable fertilisers, as well as through the implementation of soil testing and analysis. By selecting crops that are better adapted to local conditions and by rotating crops to avoid the buildup of salts in the soil, crop selection and rotation can also play an important role in the management of waterlogging and salinity. This can be accomplished by selecting crops that are better adapted to local conditions. In addition to helping to reduce waterlogging and improving the health of the soil, investments in drainage infrastructure, such as the construction of drainage channels, ditches, and subsurface drainage systems, may be of great benefit. However, this kind of infrastructure demands a substantial amount of financial

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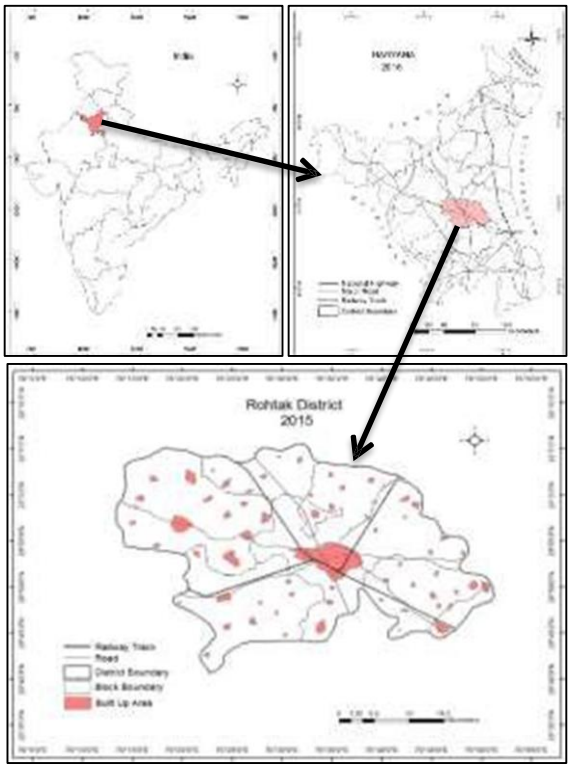
resources and technical experience. Because of this, it is vital to interact with government agencies, non-governmental organisations, and other stakeholders in order to mobilise resources and skills.



Source: Dr. Mehtab Singh, Professor, Scientist Department of Geography

Geomorphology and soil types

The land of the district is covered with alluvium that originated in the Indo-Gangetic region. There is nothing on the surface that is even somewhat interesting to discuss. The region has a topography that may be described as being flat. An average slope of 0.19 metres per kilometre can be found in this region, and it slopes from northeast to southwest. The average height of the area, measured in metres above mean sea level (MSL), ranges from 215 to 222 metres. The texture of the soils in the area ranges from very fine to medium. In the Rohtak, Sampla, and LakhanMajra blocks, it is mostly sandy loam, whereas in the Kalanaur and Meham blocks, it is predominantly loamy sand with sporadic occurrences of clay loam. The soils have a high potassium content, a moderate phosphorus content, and a low nitrogen content. The region has both desert brown (Solemnized) and sierozem soils, both of which are categorised as arid.

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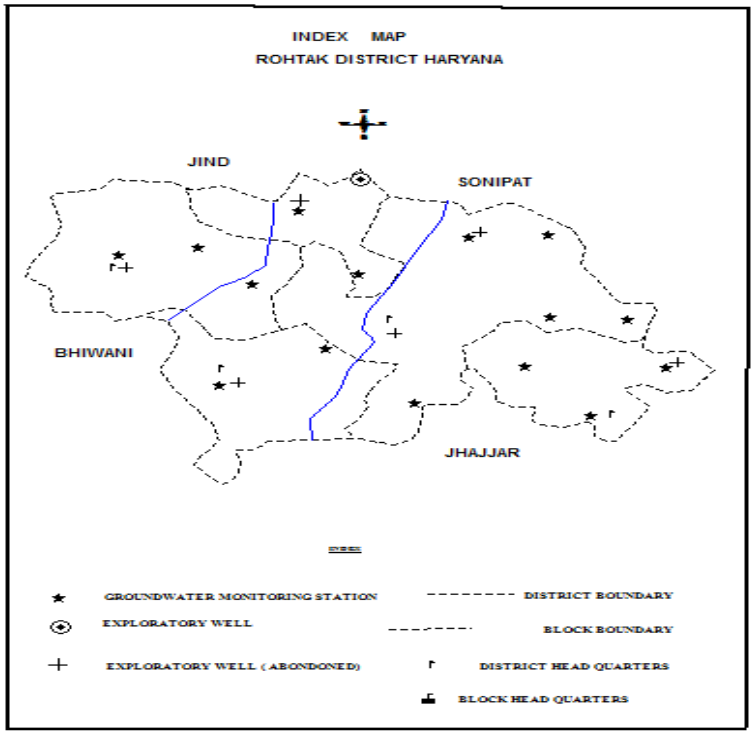

status of ground water development

The majority of the district's potable water comes from canals located across the area. In order to make up for the shortfall in water delivery to the towns, cities, and villages, members of the public have taken it upon themselves to build hand pumps for themselves as a point source of water that is both accessible and handy. There are 16995 minor irrigation units, and the depth of these units ranges from 15 metres to 20 metres. The vast majority of these shallow tube wells are of the cavity kind and are powered by either diesel engines or electric motors.

Review of literature

(Central Ground Water Board 2013) studied ground water information booklet rohtak district, haryana discovered this and The climate of the Rohtak district may be described as subtropical monsoon, mild and dry winter, hot summer, and sub-humid. The climate is mostly dry, with extremely hot summer and chilly winter, with the exception of the monsoon season, when moist air of maritime origin penetrates into the district. The hot weather season begins in the middle of March and continues until the final week of June. After that comes the south-west monsoon, which continues until September. The post monsoon season consists of the transitional phase that runs from September through November". The beginning of winter occurs in the end of November, and it lasts until the first week of March.

(Anon 2014) studied impact of Water Logging and Salinity on Agriculture and Socio-Economic status in Rohtak and Jhajjar District discovered that portions of dry and semi-arid countries that are watered by canals are seeing an increase in salinity as well as water logging, both of which have become major concerns. The effects of waterlogging and salinity on agricultural production and urbanisation were investigated in this research. Data from many dates' worth

of the IRS LISS III will be used for this purpose. "The ERDAS IMAGINE programme will be used to carry out the analysis that is intended for this purpose. In addition to the use of remote sensing data, photographs from LISS III in 2002 and LISS III in 2010 were utilised for this purpose. Additionally, sheets from the Survey of India and ground water depth data were utilised. Find areas in the Indian state of Haryana that are affected by salinity and waterlogging with the assistance of geoinformatics. In this state, approximately 500,000 hectares of land are waterlogged and unproductive, and the size of the waterlogged area is growing, which poses a risk to the long-term viability of agricultural production. The depth of the groundwater over the time period of the research is around 20 feet, which is the primary cause of water logging and salinity. A increase in the groundwater table of 0.198 metres per year was projected for the region under investigation. owing to the fact that the level of the groundwater table has been steadily increasing. Salt may be found in many different areas of the research site. The development of salinity may occur naturally; however, in areas where natural ecosystems have been disrupted by human activity and the hydrology of the landscape has been altered, the production of salinity has been modified by the flow of salts into rivers and onto land. This is starting to have a significant impact on our natural environment, which will have a negative impact on the profitability of our agriculture sector and cause harm to both public and private infrastructure. The primary objective of this research is to develop methods for reducing waterlogging and increasing salinity.

(Kaushik, Dhote, and Thakur 2017) studied identification of waterlogged areas in Rohtak district using satellite imageries discovered that and Remote Sensing is a technology that is both extremely reliable and expedient in terms of evaluation and mapping of surface regions that are waterlogged. Researchers have presented a variety of image processing approaches in order to extract water characteristics from satellite photos. These techniques may be seen below. For the purpose of this research, a band ratio-based NDWI index (Normalized Difference Water Index) was used for the purpose of extracting water pixels from optical imageries. SAR (Synthetic Aperture Radar) pictures were also used to remove waterlogged regions in order to get beyond the problems of false positives and cloud penetration that are inherent to optical imaging techniques. In order to differentiate between sea and land features, the thresholding of NDWI for optical pictures and Sigma0 for SAR images was carried out with the aid of their respective histograms. The elevation profile that was derived using the DEM (Digital Elevation Model) indicated that the northern and north-western sections of the district had higher heights and slope towards the southern and centre areas of the district which have lower altitudes. In the Rohtak district of Haryana, the amount of surface waterlogged regions changes seasonally from the pre-monsoon to the post-monsoon period. The findings of integrating the waterlogged regions of the surface that were obtained from optical and SAR pictures are shown here.

(Anon 2019) studied causes and temporal inventary of water logging and salinity: a case study of rohtak district, haryana discovered this and The most significant and emotionally charged problems in the east central region of the state of Haryana are the water logging and salty regions. In places that are flooded and/or watered by canals, this is a situation that poses a

threat. The current research focused on the southeastern and central-eastern regions of the state of Haryana. Discuss the alterations that have occurred as well as the primary reasons of salinity and water logging in this research. The anthropogenic activities of human beings are the primary contributors to the waterlogging that occurs in this region. It has been stated by the Central Ground Water Board in Chandigarh that.

Conclusion

In conclusion, waterlogging and salinity are two significant issues that have a negative impact on agricultural production and sustainability in Rohtak, India. These problems provide important social, economic, and environmental concerns, and they have an effect on the farmers' ability to make a living, on the safety of their food supply, and on the local ecology. The resolution of these issues calls for an all-encompassing strategy that takes into account a wide range of aspects, such as methods of water management, the state of the soil, the crops that are chosen, and the drainage infrastructure. It is feasible, via the development of these places, to reduce the impacts of waterlogging and salinity, improve crop yields and quality, and encourage sustainable agriculture in the region. It is vital to encourage the use of sustainable irrigation systems, such as drip irrigation and rainwater collecting, and to minimise dependency on groundwater in order to accomplish these objectives. In addition to this, it is essential to improve the state of the soil by amending it with organic matter, applying the necessary fertilisers, and doing soil testing and analysis". In addition, the selection of crops and rotation of those crops may assist in the management of waterlogging and salinity. Furthermore, investments in drainage infrastructure can enhance soil health and reduce waterlogging. Farmers, local communities, government agencies, and non-governmental groups need to work together in order for these policies to be successfully implemented so they may achieve their intended goals. It is conceivable, through collaborative efforts, to eliminate waterlogging and salinity in Rohtak, promote sustainable agriculture, and improve the well-being of both local populations and the environment. These goals may be accomplished by working together.

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