

## FOCUSING RAINFED AREA DEVELOPMENT

Jammu and Kashmir (J&K), a region known for its diverse geography and climate, is home to a significant portion of rainfed agricultural land. These rainfed areas, primarily relying on monsoon rains, present both challenges and opportunities for sustainable development. Given the unique ecological and socio-economic landscape of J&K, the focus on rainfed area development is crucial for enhancing agricultural productivity, improving livelihoods, and ensuring food security.

Rainfed agriculture constitutes the backbone of the rural economy in J&K. It covers approximately 70% of the region's total cultivated area and supports a large population dependent on agriculture for their livelihoods. The agriculture sector in J&K is not only vital for food production but also plays a key role in cultural practices and rural identity. However, rainfed regions often face challenges such as erratic rainfall patterns, soil erosion, and limited access to modern agricultural practices and inputs. These factors can significantly impact crop yields and farmer incomes.

The monsoon is unpredictable in J&K, leading to periods of drought followed by excessive rainfall, which can cause flooding and soil degradation. This variability creates uncertainty for farmers, making it difficult to plan and manage agricultural activities.

Soil erosion is a major concern in rainfed areas, exacerbated by deforestation and unsustainable agricultural practices. The loss of topsoil affects soil fertility and, consequently, agricultural productivity.

Farmers in rainfed areas often lack access to modern farming techniques, quality seeds, and fertilizers. The absence of extension services further hampers their ability to adopt best practices.

Poor infrastructure and limited market access hinder farmers' ability to sell their produce at fair prices. This lack of access to markets often leads to lower incomes and financial insecurity.

To address these challenges and promote sustainable development in rainfed areas of J&K, a multi-faceted approach is necessary.

Implementing rainwater harvesting systems and constructing check dams can help capture and store rainwater, ensuring a more reliable water supply during dry periods. Additionally, promoting techniques such as contour farming and agroforestry can reduce soil erosion and enhance water retention in the soil.

Encouraging practices like terracing, cover cropping, and the use of organic fertilizers can help improve soil health. Government initiatives that focus on reforestation and afforestation can also contribute to soil conservation and ecosystem restoration.

Providing farmers with access to modern agricultural technologies and extension services is crucial. Training programs focused on sustainable farming practices, pest management, and crop diversification can empower farmers to increase their productivity and resilience to climate variability.

Developing infrastructure such as roads, storage facilities, and market centers can improve farmers' access to markets. Establishing cooperatives can also help farmers pool resources, share knowledge, and negotiate better prices for their produce.

Introducing credit schemes and insurance products tailored for rainfed farmers can provide them with the necessary financial security to invest in their farms. Subsidies for inputs such as seeds and fertilizers can also alleviate the economic burden on farmers.

Investing in agricultural research focused on developing drought-resistant crop varieties and sustainable agricultural practices is essential. Collaborations between government, universities, and research institutions can drive innovation and address local agricultural challenges.

Involving local communities in decision-making processes ensures that development initiatives are culturally sensitive and meet the specific needs of farmers. Community-based organizations can play a vital role in this engagement, fostering a sense of ownership and responsibility toward sustainable practices.

The government of J&K has recognized the importance of rainfed area development and has initiated several programs aimed at enhancing agricultural productivity. The National Mission for Sustainable Agriculture (NMSA) and various state-level schemes focus on improving irrigation, soil health management, and sustainable farming practices. Additionally, the implementation of the Pradhan Mantri Krishi Sinchay Yojana (PMKSY) aims to enhance irrigation coverage in rainfed areas.

Rainfed area development in Jammu and Kashmir is crucial for the socio-economic upliftment of the region. By addressing the challenges faced by rainfed farmers through targeted strategies and government initiatives, it is possible to enhance agricultural productivity, improve livelihoods, and ensure food security. Sustainable practices that focus on water management, soil conservation, technology access, and market linkages will pave the way for resilient agricultural systems, contributing to the overall development of J&K.

As climate change continues to impact weather patterns, prioritizing rainfed areas will be essential for building a sustainable and secure future for the farming communities in this beautiful region. Through concerted efforts, the potential of rainfed areas can be realized, transforming challenges into opportunities for growth and resilience. Engaging stakeholders, from local farmers to government bodies, will be crucial in crafting policies that foster sustainable practices while ensuring the protection and enhancement of vital rainfed ecosystems.

# Adverse effect of melting glaciers in J&K

■ MOHAMMAD HANIEF



The glaciers in the Kashmir Himalayas are melting rapidly, threatening water security in the region. This alarming rate of glacier melt in Kashmir and Ladakh has raised concerns among experts, who warn of significant impacts on regional water availability and hydrological systems. The melting glaciers in Jammu, Kashmir, and Ladakh will affect water, food, and energy security, with adverse consequences for the livelihoods that depend on them. The researchers explained that the main drivers of the glacial melt in the Himalayan region are increasing temperatures and decreasing snow precipitation, resulting from greenhouse gas emissions from industrialization and increasing use of fossil fuels worldwide.

The slow-moving glaciers of the Himalayas, essentially frozen rivers of ice, supply drinking water and support agricultural needs for vast populations across the Indo-Gangetic plains. Glaciers form over thousands of years as layers of snow accumulate, with the weight of the top layers compressing the lower ones into ice. This pressure, along with the pull of gravity, causes the glaciers to move.

As the carbon emission continues to increase, the melting of glaciers has gained a pace in Jammu & Kashmir while as the experts assert that the union territory has lost nearly 30 percent of glaciers in the past 60 years and warned that 70 percent of them will receive by the end of this century if the prevailing pace continues.

As per the available media reports in which experts informed that there are 18000 glaciers in Jammu, Kashmir and Ladakh, but all of them are melting. The glaciers are melting in the entire Himalayas including J&K. In the past couple of years, the melting of glaciers has increased. The record melting of glaciers was witnessed last year and this year it was a bit low.

Described as 'nature's bulldozers', these solid rivers melt gradually with rise in temperatures and pick up vegetation and silt that comes in their way while flowing creating



snow bridges, gullies, glacial lakes, glacial troughs, icefalls, valleys, crevasses and moraines and cause major changes in the topography as they descend forming rivers rich in sediments.

Kolohai glacier is Kashmir's biggest glacier and is the main source of water for the river Jhelum, which serves as a blessing for the fertile Kashmir valley. It is named after the Kolohai peak - 'Goddess of Light' and forms the West Lidder river upstream of Pahalgam and the East Lidder. Both the rivers join together to form the Jhelum river near Anantnag. Kolohai's meltwater renders the Kashmir Valley extremely fertile with cultivation of cereal crops, dry fruits, saffron, and apples.

Kolohai Glacier has lost almost 23 percent of its area since 1962 and has fragmented into smaller parts. Recent study of experts on the Kolohai Glacier, based on the last 10 years' observation, showed that the average mass balance of the glacier has increased recently. The glacier is losing mass at the rate of about 1.0 m water equivalent annually, which is significantly higher than the glaciers in the rest of the Himalayas. The mass loss of the glaciers is expected to exacerbate in future as a result of the projected climate change, and thus further diminishing the stream flow of the trans-boundary rivers emanating from the region.

Glaciers in Kashmir, including the Thajiwat glacier in Sonmarg, Kousar-Nag

glacier, snow reserves in Shopian, and the renowned Tarsar Marsar and Nun Kun Peak glaciers, are all experiencing accelerated melting due to the worldwide impact of global warming, as the consequences of this retreat are dire, as rising temperatures triggered by climate change and excessive pollution continue to take their toll.

The environmentally fragile region of Ladakh is also not spared from these adverse effects, as rising temperatures caused by climate change have put its glaciers at risk. The vulnerability of the Himalayan regions to Glacial Lake Outburst Floods (GLOF), increased chances of cloud bursts, sudden flash floods, and the looming threat of moronic material breach.

Climatic change-induced stream flow depletion is possibly one of the causes of land system changes in the Lidder watershed, the economic considerations perhaps play a much bigger role in forcing the massive unplanned land system changes in the watershed. However, the depleting stream flows in the Kashmir region can greatly affect water security in the region and have a major influence on agriculture, hydropower and domestic water use, given the changing climate prevalent over the region.

Experts observed that unprecedented increase in temperature, deforestation, increasing human activity, especially around Kolhai Glacier and high levels of pollution

caused by the emission of greenhouse gases by vehicles and cement plants are major reasons for retreating of Kolhai Glacier. With decreasing precipitation trends including snow over Kashmir, warmer temperatures in winter lead to less accumulation of snow and more recession of glaciers in the region.

Smaller glaciers are retreating more rapidly than larger ones due to their greater sensitivity to climate change, driven by their lower elevation and smaller accumulation areas. Glaciers located between 4200 and 4400 meters have receded more significantly than those found above 4800 meters. Additionally, glaciers with steep slopes experience less recession compared to those with gentler slopes, as the steeper slopes facilitate a faster transfer of glacier mass from the accumulation area.

Being an eco-fragile zone, Jammu and Kashmir is confronted with environmental challenges due to global warming, unplanned urbanisation, deforestation and encroachment of water bodies. Climate warming will not only affect the retreat patterns but might affect dependent sectors of the economy that include agriculture, hydropower, and tourism.

In Kashmir, the increasing pace of industrialization and the proliferation of concrete structures are exacerbating the environmental impact. Plastic pollution is another significant issue that is deteriorating water bodies, emphasizing the urgent need to address this menace seriously.

The Jammu and Kashmir government in its Draft Environment Policy, aimed at conserving the fragile environment, has recommended measures to protect and conserve critical ecological systems including climate change. The glaciers in Kashmir play a vital role as a major water source for irrigation through canals and water streams. Should these glaciers continue to melt at the current alarming rate, the region will face a deficit of irrigation for agricultural lands in the future.

This situation demands urgent attention and concerted efforts to mitigate the adverse effects of climate change on the region's glaciers and the ecosystem they sustain. The time to act is now to ensure a sustainable future for Jammu and Kashmir.

## Innovative Agricultural Technologies for Rural Prosperity

■ DR. BANARSI LAL

Agricultural technologies have long been promoted by the governments and development organisations as an effective way to increase farm income and reduce poverty. It is the most important sector in the Indian economy. This sector contributes immensely to employment, foreign exchange, food and many other sectors. Agricultural sector is the basic catalyst and accelerator of growth and development of the industrial and services sectors. It is no longer possible to mitigate the needs of the increasing population and to achieve the food security objectives by expanding the areas under agriculture. But this problem can be solved by increasing the agricultural productivity by utilizing the yield increasing modern technologies. Agricultural research and technological improvements are therefore crucial to increase agricultural production and productivity and thus can reduce the poverty and meet the demands of food without irreversible degradation of natural resources. Modern technologies play a crucial role in agricultural production and productivity. Technological uses are influenced by the technical trainings, meetings, campaigns, demonstrations, trials, oral transmission and credibility on technician and belief level on technology. Adoption of new technologies varies differently for the progressive, young and educated farmers. Generally the farmers are having positive perception of technologies but they face lot of problems in technology adoption due to lack of capital, guidelines and compensation policy. State and Central Governments are providing facilities to the farmers in increasing their crops yields through the use of various technologies and schemes.

An increase in agricultural productivity is a prevailing motive for the Indian farmers and a driving force in India's agricultural policy. The success of modern technologies can be obtained by knowing how to apply fertilizers, pesticides and take care of plant for its healthy growth. A farming system is the result of a complex interaction of a number of interdependent components such as soil, water, crops, livestock, labour and other resources within an environmental setting. The total environment can be divided into two elements: technology and human. Technology determines the type and physical potential of different enterprises and includes the physical and biological factors that can be modified. The human element is characterized by exogenous and endogenous factors which can be controlled by the farm household. It is the household which ultimately decides whether to adopt a new technology or not. The decision of use of technologies is dependent on how farmers perceive the technology.

After independence, India has made tremendous progress in agricultural development. There has been substantial increase in available food-grain per capita. Before mid 1960s, India relied on imports and food aid to meet domestic requirements. Severe drought in 1965-66 compelled India to reform its agricultural methods. India adopted significant technological reforms and focused on the food grain self-sufficiency. This ushered in India's Green Revolution. Superior high yielding and disease resistant wheat varieties in combination with better farming practices to improve production and productivity were adopted. A hectare of Indian wheat farm that produced an average of 0.8 tons in 1948 produced 4.7 tons of wheat in 1975 from the same piece of land. Such fast growth in farm productivity enabled India to become self-sufficient in the food grains.

By 2000, Indian farmers adopted wheat varieties capable of yielding 6 tons of wheat per hectare. With Green Revolution success in wheat and rice was exceptionally obtained. Benefits of improved farming technologies now largely depend on whether India develops infrastructure such as reliable irrigation network, electricity production, flood control systems, transportation facilities and competitive buyers of produce from the Indian farmer. Agronomically the package of technologies may seem attractive but the farmer may not accept due to the financial risk. The provision of appropriate credit facilities may sufficiently reduce the risk element to make the package more attractive.

The reasons for lack of adoption of modern technologies are as follows:

- (1) If the farmers are illiterate or less educated.
- (2) If the technology is new to the farmers then generally they will not believe on it immediately.

(3) They might not have seen the demonstration fields of the technology. (4) Worry of low yield (5) Old age farmers do not believe on new technology and only believe in their past experience (6) Old behaviour of cultivation practices embedded in farmers mind for a long period (7) Large land holding farmers think that if the yield is lost due to the use of new technologies in larger area, the amount of loss will be greater. (8) Lack of capital (9) Lack of skilled labour. Generally numerous factors have been identified for the use of modern technology in agriculture. The results of agricultural research include high yielding crop varieties, better livestock breeding practices, more effective fertilizers and pesticides and better farm management practices etc. Agricultural research and development are required to increase the production and productivity. Education also speeds the rate of adoption of new technologies by farmers. Farmers who have more education may be better able to assess the merits of technology and can successfully adopt the new technology for their benefits. A large share of agricultural research expenditures is devoted in the maintenance of research. Educated farmers can gain technology skills through education to solve their field problems. Education is thus an investment in human capital analogous to a farmer's investment in physical capital. Education hastens the rate of development of new system. It is also kept in mind that required input for the technology is available or not.

There is need to look into the societal and cultural standards in which the technology operates. Collective technologies are more easily adopted as collective action reduces transaction cost. Affordability of the technology is an important indicator for their wider use as cost is the major factor in encouraging or discouraging the application of appropriate technology in developing economies. In India labour is relatively cheaper than capital and thus, labour-intensive technologies are less costly. It is an important factor to find out how smoothly technology works in the local production system and the supportive system that explains to what degree is the technology system dependent or system independent. This indicates the need for

understanding two types of risk i.e. the internal and external risk. Although analysis of risk is necessary before applying new technology, it is almost impossible to remove all risks. If the chosen device is static it will relatively reflect the short-lived solutions to a much larger problem. The technology, which supports the continuation of development by enhancing capability to expand, can be expected to compete at the regional, national and international level. A significant positive relationship between infrastructure and Indian agricultural productivity is essential to boost agricultural productivity. Improved road connectivity can reduce the farmers' cost of acquiring agricultural production inputs and of transporting outputs to market. Performance of the technologies can be explained on the basis of their success and failure stories. The performance can also be assessed on the basis of percentage of population adopting to a particular technology. Modern technologies are helpful in improving the crops yields, protecting crops against diseases and pests, making livestock healthy, designing the best methods of crops storage and even helping in predicting the climate conducive for agricultural practices. The use of modern agricultural equipments and machineries help in making agricultural practices easy for the farmer. In the developing countries like India agricultural mechanization is the order of the day. Promotion of technology with social wisdom can help in preventing migration of youth from rural to urban areas, mitigate the adverse impact of climate change and revive agriculture for sustainability of India's growth. It has been observed that the process of adoption of new agricultural technologies in India specially in hilly state J&K has been slow and interrupted mainly due to constraints like lack of capital, low price of agricultural produce, insufficient cold storage facilities, transportation facilities, Mandis, high rental charges of implements and machines inadequate institutional credit, lack of soil and water testing facilities, inadequate irrigation facilities and high cost of agro-inputs.

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## Dussehra symbolizes the victory of Good over evil

■ OMKAR DATTATRAY

Dussehra is a festival that unites people across India in the celebration of good prevailing over evil. It strengthens the spirit and doctrine of unity in diversity as this festival is celebrated on Pan India basis. It is a time for reflection, tradition, and community, as people come together to remember the heroic deeds of Lord Rama and the significance of righteousness. Dussehra, also known as Vijaydashmi, is one of the most prominent and widely celebrated Hindu festivals in India. This festival, which marks the triumph of good over evil, holds immense cultural and religious significance. Dussehra usually falls in September or October, depending on the lunar calendar. The festival typically concludes with the burning of effigies of Ravana, Kumbhakaran and Meghnad, symbolizing the victory of good over evil. This is a Hindu festival that celebrates the victory of Lord Rama over demon king Ravana. According to epic Ramayana, Ravana Kidnapped Lord Rama's wife, Sita, and took her to

Lanka. After an epic battle lasting ten days, Lord Rama, aided by Lord Hanuman and his loyal army, vanquished Ravana symbolizing the victory of righteousness over evil. The day of Ravana's defeat, which is the 10th day of the bright half of the lunar month of Ashwin, is celebrated as Dussehra. The festival represents the victory of virtue and righteousness. It is time for people to reflect on the importance of truth, morality and the triumph of good over evil. This day signifies the righteousness and valor of Lord Rama and eventual defeat of evil Ravana. Dussehra also marks the end of the Navratri festival, which celebrates the various forms and manifestations of the goddess Durga. In south Indian states, Dussehra is celebrated as the Ayudha Puja, during which people clean and decorate their tools, vehicles and weapons. This is a show of gratitude to the tools that help people to earn their livelihood. The Ram Lila is a dramatic reenactment of scenes from Ramayana. It is a significant part of Dussehra celebrations, with artists and actors portraying charac-

ters from the epic. This theatrical performance narrates the story of Lord Rama's life and his victory over Ravana. These performances often take place in open fields and are attended by large crowds. In some regions, Dussehra concludes with the immersion (Visarjan) of Durga idols, concluding the Navratri festival. This is a grand and colorful event.

A wide range of delicious sweets is prepared during Dussehra, including Jalebi, ladoos and special dishes like sabudana Khichdi in some regions. It is a time for families and communities to come together and enjoy these treats. On Dussehra, it is customary to receive Tika (vermillion) on the forehead from elders as a blessing, along with some Prasad (blessed food). This is a symbol of protection and good luck.

People visit temples dedicated to Lord Rama and offer prayers on Dussehra. Temples are often beautifully decorated, and idols of gods and goddesses are adorned with finery. Dussehra is celebrated with enthusiasm

throughout India, but various regions have their unique customs and traditions. In the northern states, the burning of Ravana's effigies is the most important and popular tradition.

These effigies can be enormous and are filled with fireworks, making for a spectacular display. In the southern states, the focus is often on Ayudha Puja, where tools, vehicles and instruments are cleaned, decorated and worshipped.

Dussehra is a festival that unites people across India in the celebration of good prevailing over evil. It is the time for reflection, tradition, and community, as people come together to remember the heroic deeds of Lord Rama and the significance of righteousness. The festival showcases the rich cultural diversity and religious heritage of India, making it an occasion that is both spiritually profound and visually captivating.

It promises to be a day of joyous festivities, rituals, and the symbolic destruction of evil, marking the triumph of virtue and light. Dussehra, also called Dasara or

Vijaydashmi, in Hinduism is a holiday marking the triumph of Rama, an avatar of Vishnu, over the 10-headed demon king Ravana, who abducted Rama's wife, Sita. The festival's name is derived from Sanskrit words dasha (ten) and hara (defeat). Dussehra is the most auspicious festival celebrated by Hindus across India. This festival is also popularly known as Vijaydashmi in some parts of the country. According to Hindu mythology, it is believed that on this day Goddess Durga eliminated the demon Mahishasura from earth. Dussehra is celebrated with great fervor and fanfare. In north India it incorporates Ram Lila, a gala theatrical enactment of Rama's life story. Effigies of Ravana—often with those of Meghnada (Ravana's son) and Kumbhakaran (Ravana's brother)—are stuffed with firecrackers and set ablaze at night in open fields. Thus Dussehra is an important Hindu festival that is celebrated in September/October. The festival is celebration of the victory of Lord Rama over demon king Ravana in the Hindu epic, Ramayana. Dussehra in

simple terms signifies the victory of good over evil. Dussehra is celebrated all over the country on the same day. Dussehra also commemorates Goddess Durga's triumph over Mahishura in defending the world from him. The glorious nine-day celebration of Navratri comes to end with Dussehra holiday. The tenth day of this fortunate event symbolizes the victory of good over evil. It takes place in the seventh lunar month of the Hindu Calendar, Ashwin. The Gregorian calendar places Dussehra between the months of September and October. This occasion is also referred to as Dasara. In several regions of India, Dussehra is a season of joy and celebration. In brief Dussehra festival represents the annihilation of evil and haughtiness via the adoption of moral values and righteous conduct. Let us uphold the truth and goodness and shun untruth and evil in all forms. This is the best way to remember Lord Rama, his life and teachings which we should emulate.

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