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Towards Drought Free India

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About this issue

India is reeling under an intense drought situation which has affected close to 330 million people from 10 states. Bad monsoons and weak policies around water security have further compounded the problem and precipitated a crisis. Rising temperatures and acute water shortages are adversely affecting human health as well as the economy which is primarily reliant on agriculture.

This issue of *Southasiadisasters.net* is titled 'Towards Drought Free India'. Droughts are complex, slow on set disasters which have great implications for society and the economy. With close to 60% of the population involved in agriculture and allied activities, droughts in India can be particularly debilitating. They disrupt rural livelihoods and lead to an increase in distress migration.

A combination of strong policy measures and robust grassroots initiatives are needed to alleviate the distress caused by the droughts. This issue of *Southasiadisasters.net* takes stock of such measures. It highlights the prevailing drought situation from 7 Indian states, viz. Maharashtra, Bihar, Gujarat, Andhra Pradesh, Uttar Pradesh, Jharkhand and Madhya Pradesh. Short and long term measures to combat the adverse impacts of such droughts have also been elaborated. In a predominantly agrarian country like India, livelihood security during a drought is perhaps the most effective preparedness measure. This issue also highlights how the Mahatma Gandhi National Rural Employment Generation Scheme (MNERGS) can be leveraged to provide succor to drought affected rural communities. ■

– Kshitij Gupta, AIDMI

LOCAL LEVEL ACTION

Drought in Gujarat: Need for Adaptation Measures

States of India such as Gujarat are increasingly facing droughts. What is needed is large scale adaptation measures.

Gujarat is reeling under an acute drought and shortage of drinking water in areas like Saurashtra, Kutch and some northern parts of the state. Last two monsoons have been below normal, causing a shortage of drinking water and adversely hitting the agriculture, which is the main source of livelihood for more than 80 % population in the state. Due to uneven and erratic rainfall last year, the state's reservoirs and dams, which supply water for drinking and also irrigation, remained half filled and at present, they are nearly empty holding less than 20 % storage.

Besides agriculture and drinking water shortage, the drought has also affected cattle breeding and animal husbandry throughout the state.

The Gujarat government has recently declared total 1150 villages as "scarcity hit" in Rajkot, Amreli, Kutch, Jamnagar and Dwarka district. In these villages, the state authority is providing water through tankers and subsidized fodder for the cattle. However, the state's unfolding response in tackling the scarcity has already created a huge shortage of drinking water in rural areas where no other sources are available.

As an emergency measure, the government of Gujarat has declared that water stored in any reservoir or any dam will be reserved only for drinking purpose, hitting the farmers who would not get any water for irrigation. This measure may lead to loss of crop.

Recently, farmers in Banaskantha district had blocked highways demanding release of water for irrigation as their standing crop was wilting. Similarly, farmers of Bhavnagar district were on protest for last few days demanding irrigation water from Shetrunji dam because the irrigation department stopped supply on the grounds that the water is reserved for drinking purposes.

SC Directs Centre, States to Tackle Drought

In a scathing 53-page verdict on the "lack of will" shown by the Centre and States in combating drought and saving lives, the Supreme Court on Wednesday pronounced the Centre guilty of "washing its hands of" a national disaster that consumed one-fourth of the country. It also pulled up Gujarat, Bihar and Haryana for adopting an "ostrich-like attitude" towards declaring drought and driving their own people to suicide, starvation and mass migration. ■

Source: http://www.thehindu.com/news/national/declaration-of-drought-define-time-limit-supreme-court-tells-centre/article8584340.ece

According to one estimate of civil society groups, more than 5000 villages in Saurashtra and Kutch will be severely hit with water and fodder crisis in summer and the state administration is not gearing up to address the crisis and create support systems to deal with the emerging situation. Over 50 towns and Saurashtra and Kutch don't get water supply on day-to-day basis.

As per the union agriculture ministry's drought management division, in Gujarat, an area of 43,938 sq km in 14 districts has been declared as drought prone. According to the survey of Drought Prone Area Programme (DPAP) there are 67 blocks in these 14 districts where drought occurs once in every three year.

In Ahmedabad district, there are six blocks of 4,429 sq km which were covered under DPAP, while in Vadodara there are five blocks of 3,244 sq km area. In Saurashatra region of Amreli 11 blocks with an area of 7,393 sq km were covered under DPAP, followed by Bhavnagar, 4,896 sq km, Junagadh, 3162 sq km and Porbandar 1,729 sq km. Out of the total cultivable land of 9.7 million hectares in the state, about a third is irrigated area, while a large part of the land is rain fed, thereby leaving farmers exposed to the vagaries of monsoon.

On its part, the Gujarat government has spent over Rs 20000 crore in Narmada canal and pipeline network to create a water grid to supply water in parched districts and far flung areas in north Gujarat, Saurashtra and Kutch.

However, coastal districts like Junagadh, Amreli and Dwarka are not covered under the Narmada project and are therefore adversely affected by the poor monsoon in terms of water availability for drinking and agricultural purposes. The inordinate dependence of these districts (expect Jamnagar) on agriculture has further exacerbated the drought situation. ■

– Mihir R. Bhatt

MAHARASHTRA

Drought to Jalyukta Maharashtra

The Maharashtra government has declared drought in 14,708 villages of the state. However, according to the recent data published by South Asia Network on Dams, Rivers & People (SANDRP) based on a comparative analysis of the water situation in 1972 and 2015 in Maharashtra, the drought has been cited as the result of inadequate and corrupt water management and not poor rainfall as rationalized by the state authorities.

Keeping in mind the drought situation, the government has also declared that the fees of school and college for students in these villages will be waived off. Other than this, the electricity bill of agricultural pumps too be will be waived off. The government also announced that it will establish special centers to purchase agricultural products.

Since the past two years, the Mahatma Phule water and land conservation campaign has been implemented in the state. Similarly, water harvesting activities like sludge extraction in Latur district and well refilling in Nanded district have been successfully conducted. To permanently overcome the drought situation, Jalyukta Gaav (waterful village) campaign was implemented in 5 districts from Pune division in the year 2012-13. Under this, an action plan was prepared for water harvesting and increasing groundwater level by implementing various schemes collectively through coordination of all departments.

Government officials and citizens gathered at the Latur railway station to welcome the water train. (Source: http://www.hindustantimes.com/rf/image_size_640x362/HT/p2/2016/04/12/Pictures/distributed-destination-distribution-marathwada-maharashtra-administration-purification_476a4460-0076-11e6-859d-3d3bb55f49d3.jpg)

To be fair, the government has been pro-actively dealing with the drought situation, but a lot more can be done. Till now, the main drought preparedness measures consist of just giving money or packages to the affected people. Also, they have cattle shades, school programs but which are mostly initiated by CSR or stakeholders other than the government. They do provide water by tankers, as this year they are using **train water supply**, but serious questions about the feasibility of such measures prevail.

We can use many new water harvesting technologies so as to save water during the monsoons. For instance, the cash- crops which requires lots of water should be cultivated depending upon the water availability. Also use of green or natural pesticides, and the use of local seeds should be given preference over western technologies.

Also crop- insurance will be a great help to the farmers. For larger scale water harvesting projects, they can use NREGA schemes, which will give them a temporary livelihood and future sustainability.

Aligning NREGA with programs of agriculture and allied sectors are leading to enhanced yields. With the scope of works under NREGA expanded to include lands of small and marginal farmers, it is now possible to significantly enhance the irrigation potential in rain fed areas and drought-proof small-holder agriculture, leading to sustainable and higher yields.

The main objective of the NREGA scheme is to provide complementing employment chances with the secondary objective of eco-restoration & regeneration of the natural resource base for sustainable rural livelihood. This in turn will help in transparency and accountability to permeate in rural governance leading to a solidification of grassroots level democracy. The following water based projects come under the purview of the NREGA scheme for drought preparedness.

- Water harvesting
- Desalting of tanks
- Micro and minor irrigation works
- Renovation of traditional water
- Provision of irrigation facilities bodies
- Flood control and protection works

Such water based projects can also be used in climate change adaptation through community involvement and as a livelihood option. Conservation technologies — stress-tolerant, climate-resilient varieties of seeds, drip irrigation, zero-tillage, raised-bed planting, laser-levelling, Systems of Rice Intensification (SRI), can build adaptive capacities to cope with increasing water stress, providing "more crop per drop".

Similarly, strengthening land development practices such as land levelling, conservation bench terracing, contour and graded bunding, and pasture development prevent soil erosion and loss of organic matter. Reclamation of wastelands and degraded lands together with afforestation, horticulture plantation and agro-forestry have the potential to sequester carbon both above and below ground, thereby contributing to carbon mitigation.

Also other projects such as land development, horticulture and road network development can be used for climate change adaptation in a drought situation. ■

– Niranjana Hingane, Tata Institute of Social Sciences (TISS), Mumbai

DISCUSSION

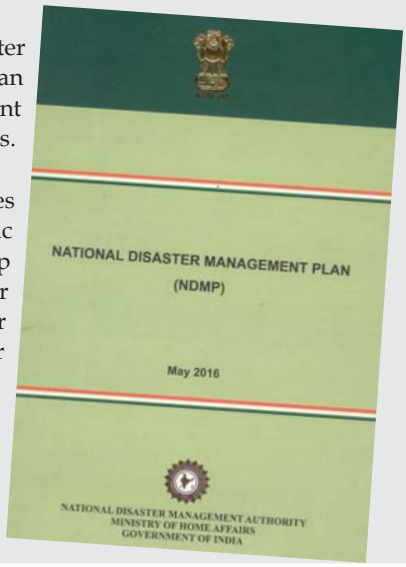
National Disaster Management Plan Celebrated at AIDMI

AIDMI team celebrated India's first and comprehensive National Disaster Management Plan (NDMP). Directions and guidelines given in the plan are aligned to SFDRR priorities and AIDMI team is committed to implement activities mentioned in the plan in AIDMI's ongoing projects and activities.

The NDMP provides a framework and direction to the government agencies for all phases of disaster management cycle. The NDMP is a "dynamic document" in the sense that it will be periodically improved keeping up with the emerging global best practices and knowledge base in disaster management. It is in accordance with the provisions of the Disaster Management Act, 2005, the guidance given in the National Policy on Disaster Management, 2009 (NPDM), and the established national practices.

The NDMP incorporates substantively the approach enunciated in the Sendai Framework and will help the country to meet the goals set in the framework. ■

– AIDMI Team



Drought In Uttar Pradesh: Role of Job Cards

The climate of Uttar Pradesh is humid subtropical with dry winters. The summer season starts from March and extends till May. However, due to changing climatic situation, it is hard to observe even traces of monsoon in the month of June. In Uttar Pradesh, 50 districts out of 75 are declared as drought prone. The figure of 67% of districts being drought prone in Uttar Pradesh sheds light on the fact that the revenue of Uttar Pradesh will decrease.

Faizabad, Jhansi, Sant Ravidasnagar, Lucknow, Allahabad, Mirzapur, Ballia and Ghazaibad are among the drought prone districts. The state government has decided not to collect revenue from the drought prone districts. In order to cope up with the drought situation, certain relief measures have been ordered by the chief minister and departments like irrigation, rural development, panchayat raj, agriculture, social welfare, institutional finance, animal husbandry and health. Line departments play a major role in the mitigation and recovery process in case of any disaster situation.

The management of drought is undertaken by both government and non-government organisations. The main role of government organisations is the management of drought in terms of analysing policy issues at national, regional and district level. Another important focus of governmental organisations is on agriculture and rural development infrastructure. In case of non-governmental organisations the main role is played by NGOs, rural institutions, private sector, and international aid agencies.

50 Uttar Pradesh districts declared drought-hit.
(Source: http://timesofindia.indiatimes.com/thumb/msid-52312726,width-400,resizemode-4/52312726.jpg)

In Uttar Pradesh the main district that is severely prone with drought is Bundelkhand. The soil of Bundelkhand agricultural field is rich for agricultural activities but it is sad that the district is facing so serious problem and people are so poor that they do not have food to eat. Although it has been more than 60 years of independence but still we are not so much developed that irrigation facilities can be provided to the drought prone areas in the state. Bundelkhand is facing drought situation since years and so the level of development in the region remains abysmally low. The drought situation in Bundelkhand is due to both the reasons, hydrological and meteorological.

Although NREGA is a ray of hope for people, but its implementation lies in the hands of the other ground level authorities. For instance, Mithula Bai of Baisai which falls under administrative region if Jiyawan, a 40 year old resident was not provided job card by the *sarpanch* because there were only 300-400 voters present in that area. So, the *sarpanch* decided to provide the job cards to people in Jiyawan.

Job cards are an entitlement. They give on identity to the person working on the drought relief measures. The cards enhance transparency of payment. The cards account for time spent as well as mention asset created in the community.

Conclusion:

The drought situation in Uttar Pradesh with the changing climatic conditions is becoming severe and Bundelkhand is one region which has been facing droughts since years. This has adversely affected the standard of living of the region's people. Lately, Marathwada has received a lot of attention for suffering from a terrible drought, but Bundelkhand which has been reeling under a protracted drought for years remains has now been relegated to the periphery of the country's consciousness. ■

– Disha Dwivedi, Student, TISS, Mumbai

Integrated Approach Plan for Drought in Jharkhand

Jharkhand has taken Integrated Approach Plan for drought. The approach integrates key inputs such as food, water, health, and livelihoods in several ways to mitigate impact o drought.

The Metrological Department shows the report in which there has been a constant decline and deviation in the rainfall pattern in India. And the whole chain of rainfall and agriculture has been greatly impacted, as the food security and human mortality is directly dependent on it. Jharkhand is a state situated among the drought affected areas like Chhattisgarh, Bihar, West Bengal thus the state is too impacted with the kind of changes in the rainfall pattern in that region. Also According to Jharkhand State Disaster Management Plan all the 24 districts of Jharkhand are drought prone and affected.

According to the India Meteorological Department, Jharkhand gets erratic rainfall, but there has been no constant decline in case of Jharkhand, as sometimes due to the cyclonic pressure in the Bay of Bengal it gets heavy rainfall as well. Thus, even though the drought condition prevails, it receives some amount of rain during that time. But in years like 2002, 2009 it was severely being affected when the coping capacity of the farmers were seriously impacted, and the government came up for their assistance.

Looking into the vulnerabilities and severity of the drought prevailing in the state for over two decades or more the government came into action. But it is only being half a decade back that the government has taken concerted action on drought mitigation, though it started very late compared to the other neighboring states. In these efforts, it has tried to seek help from various agencies and departments like Department of Land and Resources, Birsa Agricultural Trust, Global and National Climate Change etc. And mostly after the 2009 drought condition, the government has tried to mitigate the condition through various kinds of seeds and fertilizers tested in Birsa Agricultural Trust of Jharkhand, which has developed hybrid seed that can prevail in drought prone areas. Also the government has tried to link up with various NGOs working in these areas, in order to monitor the programs implemented.

According to Government of India, Ministry of Rural Development it was informed that Jharkhand had 24 districts out of which 16 were Integrated Approach Plan (IAP) districts. The tender for conducting survey and resurvey within two years is being approved; also the transferring of funds has been approved.

Through IAP the government has tried to bring up many projects and it has tried to integrate these programs like, through NREGA people are being employed, but also employed in schemes like (IWMP) Integrated Watershed Management Program, also through some other programs and provisions the affected farmers are given seeds, fertilizers and also the compensation if the year is being declared as drought hit. Also the people of the same affected villages work in these schemes, which also checks that people do not migrate to other different areas or states.

Source: http://www.indiawaterportal.org/articles/even-climate-change-discriminates-between-women-and-men

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– Nancy Bhengra,
Student, TISS, Mumbai

Diversification of Land Use Against Drought in Madhya Pradesh

Due to its varying geographical features, climate conditions and vast area, the Indian state of Madhya Pradesh has been consistently prone to drought lie conditions for years. Every year, many districts of Madhya Pradesh have been repeatedly facing the drought situation.

Drought Preparedness

To fight with the drought situation in the state, many research and development initiatives have been taking place in the recent past. The state has started focusing on weather forecasting, early warning, vulnerability and preparedness measures for the information of community, farmers and even administration. The state is focusing towards best practices for rain water and soil management through linking on station and on farm research activities. The state is also focusing on contingency crop planning as well as mid-season corrections based on the weather conditions and the forecasted reports.

To reduce the drought impact on the state, recently the focus is also being given on alternate and diversified land use systems. The use of remote sensing and GIS has also been integrated for the drought preparedness activities. Remote sensing has helped in timely, accurate and synoptic coverage of crops and also assessing crop at a range of special scales. Remote sensing data on crop environment, crop distribution and leaf area index can be coupled in a number of ways to estimate crop yield and yield loss.

Preparedness for the Current Year

Though this year prediction for south west monsoon by IMD shows that rainfall will be comparatively high than the previous years as 70% of the agriculture area is highly dependent on rainfall, but still some preparedness measures need to be taken to ensure the continuity of developmental activities in the state as well as agriculture. For preparedness, the focus can be given on arranging and distribution of essential commodities such as water, fodder and food at subsidized rates in advance only. Information and awareness to the community must be provided for optimum utilization of resources in the affected areas with emphasis on primary resources like soil, water, vegetation, livestock, and manpower, etc. Relief works must be undertaken for employment in advance for the population living in drought prone areas mainly for drought proofing.

NREGA for Drought Preparedness

The main objective of NREGA is to improve the income condition of the people in the rural area by providing the hundred days of employment to the rural families. It aims to strengthen natural resources which can be controlled through different types of works to deal with hardship of climate change and drought condition, thus to motivate sustainable development. Madhya Pradesh is one of the most drought stricken districts in the country. Almost 35 Districts of the state have been declared as drought prone district in the last financial year by the department of agriculture. Almost 9 Districts in eastern Madhya Pradesh received only 29% of the actual rain in the last year they were getting earlier. Katni was one of the severely impacted districts of the state. The NREGA scheme focused towards a set of particular non-urban growth actions such as: water preservation and growing afforestation. Hence, in order to have drought mitigation policy, watershed developments and development of percolation tanks, pond and development of check dams at the village level can be feasible for the drought mitigation within the village. It helps in conserving water, thereby recharging the ground water to the people at the same time providing employment to the villagers within their surroundings.

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NREGA aims at regenerating the environment through creation of productive assets such as water tanks, ponds, bunds, check dams and through afforestation programmes. So far the link of NREGA to climate change adaptation has not been sufficiently understood, but it is clear that the afforestation (which also serves as a carbon sink) can help in achieving the climate change goals of the MDGs. Recently, the government have come across planting trees across all the roads of the states to promote climate change and mitigation strategy. ■

– Yuvraj Singh Rajput, TISS, Mumbai

Drought in Gujarat: Using MGNREGA

Geographically the areas of Gujarat state can be divided in 3 major parts, Middle Gujarat, Kutch and Saurashtra, South Gujarat. Historically, Middle Gujarat and South Gujarat get enough rainfall every year and these areas are also have good water resources with major rivers and dams like Narmada, Tapi, Sabarmati etc., while most of the other parts Kutchh and Saurashtra are affected by droughts. Many studies show that on an average every 3 to 4 years, Kutchh and Saurashtra are affected by a drought.

Major part of Gujarat's population (more than 60 %) is engaged in agriculture and allied activities. In agriculture economy drought is most probably the worst disaster which makes great implications. After droughts or drought like situations it is very difficult for marginal and medium farmers and agriculture labourers to survive. The Financial crisis, which occurs from droughts are making communities more vulnerable. Ultimately, in recent years the crisis situations due to droughts are leading towards farmer suicides and Gujarat is at 13th position in number of farmer suicides with 564 farmer suicides in the state in one single year.

1. What has happened in the state regarding preparedness in the last 2-3 years?

It was the state government's target to provide drinking and irrigation water throughout the state by the year 2012 from the Narmada river, through pipelines and canals. Due to various reasons the state government fails to provide drinking and irrigational water throughout the state, however state government expanded Narmada canal network and provided water up to Kutchh. The Government of Gujarat also launched Disaster Risk Management (DRM) scheme in which it integrates various disaster management plans in to the development plans of local self-governments.

Last year too, there was a drought like situation in Gujarat state wherein many districts are facing water scarcity. The state government announced 3400 crores for drinking water. State government with the help of centrally sponsored schemes provides assistance to farmers through crop loans at subsidised interest rates. To mitigate drought and drought like situation it is very important to conserve water resources carefully, state government also provides subsidies to buy sprinklers and drip irrigation system with the aim of drought mitigation in the state.

2. What should be done in the current year?

Present year 2015-16 is also a drought year in Gujarat. Western parts of the state are facing extreme water scarcity. In response to these situations, the first focus should be on providing drinking water to highly affected villages of the state. As there are huge losses in crop agriculture production there is a need to provide more financial assistance to drought affected farmer communities. As there is a large decrease in annual incomes of farmers due to crop failures the only income source available with them is animal husbandry, so measures to provide cattle fodder should be taken so that the impacts of the droughts can be reduced. Apart from above mentioned measures government should focus on proper implementation of schemes like MGNREGA.

Some other measures consist of the following:

- Formation of drought monitoring cell to manage the severity of the event.
- Enabling drought management group would serve the situation better.
- Improvement should be on the lines of storage and storage techniques should be given preference.
- Drought proofing and crop insurance should be raised with awareness program.
- Livelihood diversification i.e. employing people into other activities apart from agriculture, so as to reduce the impact of drought.
- Improvement in drinking water in terms of groundwater table, sources, availability & quality.
- Use of advance technology, e.g. Sanghi Industries in Kutch is using technology that converts lake water into sweet water and supplies to nearby villages for drinking and farming.
- It should be mandatory for corporates to develop water conservation and crop development strategies and implement same as a part of their CSR projects.
- There are certain organic powders and solutions available which will absorb water in crops, once pored, and maintains moisture level in crops in span of a week or 10

days. Such technology is observed in Israel, where rainfall is low but crops still grow better.

- Promotion of NGOs working for water conservation and developing check dams.
- Awareness of benefits of rainwater storage at household level. People in Kutch, especially Patel community, follow this technique and avoid water scarcity problem.
- Any measures taken should lead to long term solution thus leading to sustainability, as short term techniques wouldn't resolve the problem.

3. How to use MNREGA for drought preparedness as well as adaptation to climate change?

Mahatma Gandhi National Rural Employment Guarantee Act (MNREGA) is the best scheme which can be utilized towards drought preparedness and adaptation to climate change. Towards the preparedness of drought under NREGA scheme small check dams can be built apart from that the capacity of present small lakes and dams in the villages increased by deepening them. Wherever there is availability of water irrigation canals for irrigational use, under the NREGA its capacity can be extended and government should implement the scheme so that the coverage of these canals can be extended. Under the scheme there should be promotion of various drought mitigation measures like roof rain water harvesting, etc., so that the capacity of ground water can be increased. Towards adaptation of climate change under the NREGA plantation of trees in the villages at various locations like near check dams, ponds, dams can be done. NREGA can be integrated to other schemes like watershed management scheme so that impacts of climate change can be reduced. ■

– Vira Chudasama, and
– Meet J. Gadhvi, Tata Institute of Social Sciences (TISS), Mumbai

ANDHRA PRADESH

Drought in Andhra: Making DPAP Work

Andhra Pradesh is basically an agricultural State, with 34% of its GDP contributed by agriculture. Agriculture is the major source of employment for the people as well. Drought is a recurring phenomenon in Andhra Pradesh as there is a drought in the state once every 5 years. Given the overwhelming reliance of Andhra Pradesh on agriculture, droughts tend to have a severely crippling effect on the state's economy.

In 2015, the state suffered its most severe rainfall shortage when it only received 153.8 mm rainfall against its normal of 624 mm leading to most severe drought in state in last 50 years. As a consequence of which, the Kharif crop throughout the state faced acute shortage of water which lead to crop failure. The state has been trying to tackle the problem of droughts by the implementation of various programs like Drought Prone Areas Program (DPAP), Water Harvesting Structures, Micro Irrigation Project, Watershed Development etc.

The rising population of the state has considerably increased its dependence on natural resources like forest resource and ground water. Over-exploitation of such resources has led to their depletion. With increased awareness in the community, desertification in southern drought prone drought has brought under been control. Formation of Van Samrakshana Samithies (VSS) under the community forest management programme has helped in controlling the depletion of forest in many districts. Watershed development projects have led to an increase in the net irrigated area and the ground water level has also improved considerably. Migration of labor has been decreased with this program. Projects like Rural infrastructural development, integrated watershed development, Livelihood regeneration etc. have all helped in improving the situation in the state.

The following steps should be taken to address the present drought situation:

- Along with the watershed development project, drip irrigation practice should be adopted.
- Treatment of drainage, ponds, lakes and check dams should be done to avoid water leakage/ wastage.
- Wells should be constructed near the river or on underground water drainages.
- To tackle the issue of food security and nutritional level employment programs and schemes like Sampoorna Grameen Rozgar Yojana should be continued as this will help livelihood generation and in developing infrastructure to deal with drought.
- The role of self-help groups can be increased for monitoring the

health and nutritional status of women and children to providing supplementary food to Aanganwadis.

- Anganwadis in state should be strengthened and additional temporary Anagnawadis should be sanction in high risk areas.
- Increase monitoring of Mid-day Meal Programmes during drought, as it is an important source of supplementary nutrition.
- Community kitchens should be run during the droughts.
- Information on availability and the requirement of fodder for the cattle population in the area should be calculated as cattle are an important source of livelihood in rural areas of the state.
- The Collector can project fodder scarcity for each successive month of drought.
- People have less immunity in drought situations due to poor levels of nutrition. PHC and CHC throughout the state should be trained deal with it at the most basic level. Mobile health teams should be organized for visiting all public works to do checkups.

In 2015, the state suffered its most severe rainfall shortage when it only received 153.8 mm rainfall against its normal of 624 mm leading to most severe drought in state in last 50 years. As a consequence of which, the Kharif crop throughout the state faced acute shortage of water which lead to crop failure.

The State public health department should undertake a campaign for disinfecting all drinking water sources with disinfectants such as chlorine. Since water availability is at a shallow level, it is more likely to be contaminated. Necessary care needs to be taken to clean water and disinfect it before using it for the purpose of drinking.

Train the community in disinfecting water and checking its quality for the purpose of drinking.

Worrying situation in drought-hit Telangana, Andhra Pradesh.
(Source: http://www.news18.com/news/india/worrying-situation-in-drought-hit-telangana-andhra-pradesh-1226504.html)

The State water supply department should take a special campaign for providing clean drinking water in those areas which are affected by arsenic and fluoride contamination.

The State public health department should maintain sufficient stock of chlorine and other disinfectants in the drought-affected areas.

A public health campaign should be organized for immunizing and inoculating the entire population against likely diseases such as typhoid and cholera.

Capacity Building and training of all functionaries and stakeholders should be done.

Use of NREGA:

NREGA will not only help in developing infrastructure to mitigate drought, but also to prove employment to poor and vulnerable people. NREGA will check migration in drought affected areas. Through NERGA equal opportunity to employment to women and vulnerable will be ensured. Work for food is a popular scheme in drought prone areas under NREGA.

Climate change adaptability is a multi-dimensional; it should be done from policy level to community level. At community level eco-sensitive approach will help in dealing with climate change. Balance of Nature system and Human system should be maintained. A scheme like drought, land degradation and desertification, creation of artificial drainage, underground water source regeneration and ecosystem restoration should be promoted. This restoration task can them be clubbed with NREGA which will help in improvement of condition on groundwater and forest. ■

– Ankita Padhalni,
Student, TISS, Mumbai

Impacts of Water Scarcity and the Drought Situation in Bihar

Despite the wide variety of resources, large size of land, and population of the State of Bihar, the state is prone to many disasters, especially to floods and droughts in recent times, placing the water situation in a serious crisis. The southern and western parts of Bihar are mostly affected, while also in other parts of the state the availability of rainfall is decreasing, which consequently results in threats to their agriculture, environment, living conditions and overall economy.

In the last couple of years, the state has suffered major droughts, understood as a deficiency in its water supply surface or underground, due to consistent low precipitation. These droughts have increased in the last couple of years and estimations of experts say that Bihar will reach a state of water stress by 2020, since "the gross per capita water availability in Bihar will decline from about 1,950 m3/yr in 2001 to as low as about 1,170 m3/yr by 2050".[1]

Furthermore, droughts are one of the most difficult hazards to prevent, since they slowly become visible and their appearance could be attributed to multiple causes. To better identify the intensity and duration of a drought there has to be a close look up to the weather, vegetation, temperature conditions and past experiences in the State. However, the impacts droughts have in many cities of Bihar are enlarged by the little preparation the State has to confront this hazard. This situation results in deep physical, psychosocial, environmental and economic impacts.

In terms of physical impacts, the hazards affect the soil moisture and level of ground water. "Rivers, lakes, ponds and reservoirs tend to dry up wells and tube-wells are rendered unserviceable due to lowering of the ground water table"[2]. In addition, when there is little to non rainfall, the agricultural production of many regions of Bihar is severely affected; hence there are shortages of grains and other crops, resulting in economic losses and social impacts for the people.

In August 2015, out of Bihar's 38 districts, 30 have received deficit rainfall. This is a serious concern for the state since it's highly dependent on the rain to secure the irrigation needs of the crops, which poses a scenario of high risk for crop loss. In addition, increased pollution in Bihar degrades freshwater and coastal aquatic ecosystems. This situation receives more attention when we consider that a great number of people in Bihar live and work from agriculture. If the crops are affected, so will be the people, as their income will diminish and the levels of unemployment increase.

On the other hand, there are many social impacts droughts have in the cities, mostly felt in education, in health and sanitation of the people with common diseases related to the poor quality and access to water and sanitation, and mal nutrition, even in some cases hunger.

The severity of the impact is also conditioned and triggered by the context, which includes the social and cultural practices, the economic status and the capacity to respond from the government institutions. In view of that, the most aggressive impacts are felt in vulnerable and poor areas, in which women, children and the elderly are more exposed and vulnerable. This is an important aspect, since "more than the half of Bihar's population is below the poverty line, and nine out of ten Biharis continue to live in rural areas, depending upon agriculture as a prime source of livelihood".[3]

From the illustrated impacts we understand there is a need to improve the water supply for the citizens in terms of quantity and quality and also to upgrade the sanitation facilities and services, which are essential to enhance public health and improve development within the state.

The Public Health Engineering Department of the state of Bihar is responsible of providing safe drinking water to rural areas. In order to maintain drinking water supply, it is essential to keep hand pumps functional. However during a drought scenario, the PHED's obligation to ensure its functioning in order to supply the people with drinking water becomes a critical

1 India Water Portal. "Qualitative and quantitative water scarcity issues in Bihar"

2 Mohita, Negi. "Impact of Droughts in India: Physical; Agriculture and Economic Impact"

3 Bertho, Anna; Pande Devyani; Srichand, Pankaj; Singh, Shika. "Impacts of Disaster on Children: A case study of five disaster disaster-prone districts in Uttar Pradesh and Bihar, India. Knowledge Community on Children in India.

challenge. This issue may lead to develop new water supply and sanitation schemes, which should be created with the participation of the community and by generating partnerships with several public and private stakeholders.

To gather the insights of community's representatives on how to better supply the city with water is an essential aspect in the design process, as is can define the priorities in terms of needs of the community. This issue is being raised by the Bihar State Water and Sanitation Mission of the Government of Bihar, who works with several programmes to improve water quality and sanitation in the state.

But there still has to be a consistent and long term development policy for water and sanitation." The World Health Organisation estimates that about 80 per cent of all sickness and diseases are linked to the poor drinking water and sanitation conditions"[4]. If the provision and quality of water is improved in the city, so will the conditions of the citizens.

The improvements on water management must be accompanied by additional contingency programmes, which should contribute to the emergency response process in drought scenarios. Although the government of Bihar has carried out a number of drought relief programmes to mitigate their impacts, these haven't focalized on long term effects for the State and also haven't reached many people.

The programmes should consider long term actions for shelter, food and health care, and they should reach a wide number of citizens, placing children and women as a priority. In addition, special attention should be destined to the farmers, analyzing and encouraging the use of alternative methods and technologies for preventing the loss of crops, such as alternative irrigation mechanisms, and also for taking care of the employees of the agriculture sector.

As for all the hazards Bihar may experience, an essential and cross-wide aspect to consider is the preparedness level within the villages and households. In this sense, it's indispensable to conduct activities to raise awareness in the communities on how to prepare for these situations and how to take care of children who are especially vulnerable as they're still growing and developing their immune systems. There should be actions destined to strengthen people's knowledge on the frequency and magnitude of these events, as of the government's actions and assistance. ■

– Isabella Johnston

4 Bertho, Anna; Pande Devyani; Srichand, Pankaj; Singh, Shika. "Impacts of Disaster on Children: A case study of five disaster disaster-prone districts in Uttar Pradesh and Bihar, India. Knowledge Community on Children in India.

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