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EXPLORATION OF INDIGENOUS BIO-INDICATORS FOR PREDICTION OF MONSOON

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Introduction

India is traditionally an agrarian country wherein, the farm sector accounts for 14 percent of the country's nearly $2 trillion economy, with two-third of its 1.2 billion populace living in rural areas. Indian agriculture is highly dependent on rain wherein, half of the country lacks irrigation facility. At the same time, almost 75% of the rain in India arrives during the four rainy months of monsoon season. Thus highly dependent on rain, the people in different part of the country from time immemorial have developed various traditional means and ways for the prediction of monsoon rain over the country. These knowledge of monsoon prediction are based on various tacit knowledge such as direction of winds and temperature, shape and type of clouds, various bio indicators such as flowering of some particular plants, typical behavior of birds, animals and insects, position of celestial bodies, almanac etc. The knowledge on weather and climate held by local and tribal communities can play significant role in developing location package of practices for specially agriculture. However, the formal and informal knowledge systems of local and Indigenous peoples (often called TEK) need to be documented, and tuned after careful refinement and validation. The study reveals that many such indigenous practices prevails in almost every part of the country and people especially, the farmers, rely on these information to large extent and adjust their agricultural activity accordingly. Thus, it is felt that if this indigenous knowledge is combined with the latest space and information technology, the prediction of the various weather and climate related phenomena will be more accurate and efficient. This will in turn help mitigating various climate induced disaster such as flood, drought, famine etc to great extent.

Here we describe traditional practices of monsoon prediction.

- Bamboo Partridge (*Bambusicola fytchii*)**:** If male bamboo partridges roar frequently during spring and summer in the morning after sunrise, rain is expected in the immediate future. Similarly, when it rains in the morning, the roaring of the bamboo partridge at this time indicates that the rain will soon stop for that day in that location.
- Field cricket, (*Gryllus pensylvanicus*); If a cricket brings new soil particles out of its hole during the dry season, it is thought that rain is coming soon. If the same activity occurs during the rainy season, a heavy rain is expected during the season.
- Winged termite, (*Reticulitermes* sp.)**:** When these insects come out of the soil in a group after a rainfall occurs, it is believed that rain will not come again for some time. If there was no rain in the previous day or week but the insects are coming out of the soil, rain is expected to come soon.
- Corn field ant, **(***Lasius alienus*)**:** When there are a number of ants moving along a path carrying their food items with them, a heavy rain is expected on the same day, or within one or two days.

- Common Frog **:** If the frogs croak in a water body in the afternoon until sunset, rain will be coming soon, even during winter and spring season.
- Bird/Hen and cock, **:** If local domestic chickens search for food even during the rain, it is commonly thought that the rain will last for the whole day. But if the birds stop searching for food when it is raining and take shelter (in the morning or afternoon), the rain is expected to cease soon and to be minimal.
- Location, pattern of clouds (blackish colour), **:** When the clouds are thick and black in colour, and are arranged perpendicular to the orbit of the sun in the morning, it is said that rain is approaching.
- Bug species (brown in colour, medium side, living both at the edge of the river and in the forest according to the weather conditions), *Tiauhmi* (consumed as curry)**:** If this particular bug is found under a stone on the bank of the river after the monsoon season, it is said that the autumn season is over and winter is beginning. If this bug species is found in the forest during summer, it is expected that rainfall and flooding are about to begin.
- Dried ripen chilli, (*Solanum frutescence*) and dried tobacco leaves **(***Hmarcha rep*)**:** If dried chillis become moist except during the rainy season, it indicates high humidity and imminent rain.
- Flowering pattern of peach species **:** If peach or plum flowers grow from the basal region to the terminal of the tree in flowering season, it is predicted that there will be a good rain and higher crop production than in other years. This indicator has been accurate until today.
- Fish species,(*Channa* spp.): When harsh climatic conditions (drought) prevail during the summer season, some local elders would go to the river to catch this particular fish species. They woult take it up to a hilltop, open its mouth, put small quantity of salt in it, then turn it so that its head is pointing toward the east. This is practice is said by the ancestors to call summer rains.
- Soil moisture and ground water level**:** During the spring and summer seasons, **t**he villagers might turn over any stone or border stone near a river or a hillside in an open space and or clearing within the tree canopy. If the soil under the rock or under the surface is moist it is thought that summer rain is approaching.
- Water bubble formation**:** If water bubbles forms at any place on the surface of a flowing or stagnant waterbody, particularly during a morning rain shower, it is thought that the rain will last for whole day. My experience confirmed that this indicator was applicable.
- Cloud colour, time, direction and location of appearance in the sky: If a reddish colour cloud is seen at sunset one western horizon, rain is predicted to come within two to four days. If there is thick cloud toward the south or north, the rain will be more on that side within the region. If the sky is full of reddish coloured clouds appearing after a long rainfall, it is a sign that the rain will not come again in that particular season.

Conclusion:

Globally, climate change and its effects on Indigenous communities and local biodiversity are difficult to document systematically because they are so complex. It is seldom realized that cultural traditions help in preserving and continuing plant related practices and skills, which ultimately play a direct role in conservation of indigenous biodiversity. These knowledge

systems including bio-meteorological need to be explored, studied, characterized and documented before they are lost under the onslaught of ongoing and future developmental projects.

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