Journal of Communicable Diseases
Volume 53, Issue 3 - 2021, Pg. No. 135-142
Peer Reviewed & Open Access Journal

View Point

International Collaboration: Bane or Boon

PK Rajagopalan

Former Director, Vector Control Research Centre, Indian and Council of Medical Research, 2E Lakshmi Apartments, I Seaward Road, Valmiki Nagar, Chennai, India.
DOI: https://doi.org/10.24321/0019.5138.202149

I N F O

E-mail Id:
leelaraj2004@gmail.com
Orcid Id:
https://orcid.org/0000-0002-8324-3096
How to cite this article:
Rajagopalan PK. International Collaboration: Bane or Boon. J Commun Dis. 2021;53(3):135-142.

Date of Submission: 2021-07-28
Date of Acceptance: 2021-08-07

International agencies have increasingly been playing a role in research activities in developing countries providing the vehicle for bringing in one or more of the developed countries in research. Normally this should be an ideal approach. But experience has shown that occasionally international agencies have provided cover for unscientific activities. In 1970, an Indian expert of the FAO, working in Cuba was arrested but later let off and expelled by the Cubans. His exact role witting or unwitting in the sabotage attempt was not made public. In India, an American expert working under a collaboration agreement with the Indian Agricultural Research Institute in New Delhi was found leaving the country, safely, with wheat germ plasm collected by the IARI, in 1970.

The relative ease with which big powers and developed countries seem to be able to obtain facilities for conducting research in the ocean and soil of developing countries is indeed remarkable. It is true that scientists from India and other developing countries also conduct research in Europe, America and Russia. But such research is always laboratory bound and not in the fields. Scientists from India are unlikely to be allowed to drill holes on the crust near Leningrad or Siberia or in Alaska and Texas or New Mexico or conduct joint experiments with the US in the Gulf Stream (No developing country can afford the financial resources either).

But it is instructive to note the conditions for undersea research formulated by the US during the Law of the Seas Conference in Caracas. Among the conditions were: (1) Advance notifications of all research plans (2) certification qualification and purpose of the research institution (3) participation in the conduct of research (4) sharing of all data and samples (5) open publication and (6) compliance with international environmental standards. The US conditions are an example of how big powers view international collaborating research. Developed countries and major powers by sponsoring research in India can depend on Indian scientists to conduct research and supply the data on natural resources, agriculture, personality profiles, endurance of soldiers in high altitudes or ionosphere and tropospheric data over the subcontinent or virtually any subject of interest to them.

If the intention of a country is to ruin/incapacitate the economy of another, there cannot be more devastative weapon than bio warfare agents (E. A. Siddiq). A peace loving country like ours respecting the

international obligations may not venture into biowarfare development related activities. But this stand does not mean that we should not at least be in full preparedness to defend ourselves in the likelihood of such weapons proving a threat in the near or distant future.

Here are a few examples

1. Declaring the "ever increasing threat of bio-terrorism" as a matter of "serious concern" India had proposed to set up through legislation an autonomous Agricultural Bio security Authority "with capabilities to prevent, detect, and respond" to threats to Indian agriculture and also to deal with trans boundary diseases such as the avian influenza. The bill introduced in the Lok Sabha a few years ago sought to bring together the plant, animal and marine protection and quarantine under a single umbrella with adequate powers including to declare bio security emergency in case of disease outbreak. According to the Ministry of Agriculture, which introduced the Bill, with the liberalisation of global trade in agriculture there is an increased risk of introduction of exotic pests and weeds while introduction of genetically modified organisms "require proper risk assessment and management." The new legislation will replace outdated laws - Destructive Insects and Pests Act, 1914 and the Livestock Importation Act, 1898.
2. A vigorous campaign to curb birth began in India when the population was only 400 million. But the program from the beginning was highly dominated by western concepts and failed to check the present growth of 13 million babies a year. In the initial phase the birth control programme was strongly influenced by the traditional clinic approach of the Anglo-Saxon type that insists on person-to-person instruction. Ten years had to elapse before we discovered that this approach was inadequate and that community motivation was essential. While India was groping for an optimal mechanism for community participation an influential group of foreign consultants sold the idea of "extension education." The idea caught on with Indian policy makers and key officials starting to get inducted into this new cult. It took a long time for the discovery to be made that the machinery set up at great cost did not have the capability of mobilizing the community to bring up the desired behavioural change. The failure in the field of extension technique was sought to be countered by protecting the intra uterine contraceptive device (IUCD) mainly the result again of the advice of foreign advisers and consultants. IUCD was projected as the miracle to solve India's population problem. Eminent gynaecologists and family planning experts were invited to New York in 1962 to participate in an international conference on IUCD. They returned from New York full of enthusiasm for the new device. A massive programme masterminded by foreign experts was launched. According to D. Banerji, professor of community medicine at Jawaharlal Nehru University in New Delhi objections and doubts were swept aside and a virtual mass hysteria was built up in favour of IUCD. But the programme virtually collapsed in two years and was a disastrous failure. But India under pressure to control its population provided an ideal place for testing all shapes and designs of IUCDs and the programme initiated by IUCD manufacturers accomplished just that. Even now India is a testing ground for several varieties of steroid pills under various stages of development in foreign pharmaceutical firms. For two years the All India Institute of Medical Sciences in New Delhi was testing prostaglandins an abortificient made by Upjohn's of Sweden. And in one instance the World Health Organization bypassed the Indian health Ministry and directly contact scientists in the Kalyani University in West Bengal and asked them to study and conduct clinical trials of certain steroids developed in the United States for birth control use.
3. Research in food and agriculture has not been spared either from western ideas about protein rich foods. Many nutritionists feel that in India malnutrition is basically caused by just lack of food and not protein rich food. Yet Indian scientists have joined the protein bandwagon and a substantial amount of research program in agriculture aims at increasing protein content of virtually every cereal and food crop whereas research on simple microelement in their yield. The protein obsession nevertheless helped the growth of baby food industry - lysine bread and protein biscuits - involving worsened know-how and a machinery. Recently soya bean, the high protein wonder crop is displacing the peanut at the same time making India a buyer of related equipment for extracting milk and producing other products from soya beans. Not all research collaborations of course have commercial motives. Most of the collaborations have genuinely served the cause of development. Research on wheat yield improvement which ushered in the green revolution in India is an example of developmental research.
4. But developing countries like India do become victims of programmes that simply abuse science or having military significance. In 1964, the United States mooted a weather programme called "Nomad" under this programme an instrument package was brought and placed on a buoy anchored in the Bay of Bengal, midway between Madras (in south India) and Port Blair in Andaman Islands. The package, the Indian Meteorological Department was told, was for observing

ISSN: 0019-5138
DOI: https://doi.org/10.24321/0019.5138.202149

and telemetering wind speed, temperature and other weather data. NOMAD was inaugurated with great fanfare. But data was received by IMD only for four days. Afterwards the data stopped coming and no one knew what happened to the buoy. Did the cable anchoring the buoy snap and the buoy drift? No one in IMD is sure even to this day on the fate of NOMAD or the complete capabilities of its scientific package. Did it have gadgets to snoop underwater or chartering the sea for submarines? Before NOMAD was another collaborative programme under which the US sent an aircraft supposedly carrying equipment to collect weather data. When it landed in New Delhi Prime Minister Nehru was taken inside the aircraft and shown around. The instrument filled aircraft criss-crossed the subcontinent for eight weeks. After its return to the US, a report on its scientific mission was sent to India. And that was that!

5. The Indian Ocean expedition in which the US and India collaborated was another such project. The ship was American and the primary data collected was sent to Hawaii for analysis. The project leader on the Indian side participated in the analysis but copy of the primary data was unavailable to India. What India got was a report containing charts relating to above the surface of the Indian Ocean but no underwater data. India of course got as a souvenir baskets load of phytoplankton and sea weeds collected by the ship in the Arabian Sea. They were dumped at the Naval Physical and Oceanographic Laboratory in Cochin.

The International Geophysical Year was not very different in respect of benefits accruing to India form foreign collaboration research. The IGY resulted of course in the strengthening of geological sciences departments in universities in many any countries. It also enabled the US to set up seismometers in many countries (four in India) as part of it global network for detection of underground nuclear explosions.

6. The Soviet Union has been involved in oceanographic research in the Indian Ocean. The Americans and the western navies have also been far behind in this matter and perhaps are in advance. Soviet oceanographic research activity in late fifties and has been at a fairly high level since 1968. A large amount of information has been collected about surface currents, changes in water densities variations in salinity ad temperature gradients. These data presumably have some peaceful uses but would also appear to be a valuable for use in the so-called blind zones by submarines. But the collection of such data that is going on all the time by the various ships is made simpler and easier by bilateral research programmes. The MONEX (Monsoon Research Experiment) may be an example. Monex specifically provided that the primary raw data collected would be shared by India and the USSR. But when the research vessels left the Indian Ocean no such data has been supplied.
7. The U.S. and Britain which have had “communities” in the Arabian sea and Indian ocean area have also been conducting research projects both directly and in collaboration with some of the littoral states. The US had tried to interest India in experiments with radio propagation in varying atmospheric and weather conditions. However in recent years all such research schemes are being looked at and scrutinised with greater care and many are being rejected. One may wonder why this interest of the big powers in ocean weather and geology and why they seek collaboration of Indian scientists. A clue has come from recent suggestion in the field of disarmament calling for ban on unusual weapons. It may sound like science fiction but there have been reports now about triggering earthquakes as a means of war. High intensity shock waves reportedly can be sent without much attenuation from one part of the earth to another over pathways where the curst is unbroken. Survey of the earth’s crust thus becomes an important element.
8. The PAC said that the WHO had been used as a cover for certain US research projects in India having a bearing on biological warfare (PAC report 167 para 7.1.4). It upheld the substance of an earlier news report by the Press Trust of India and charged that these and other connected projects had little utility to India but had biological warfare or other significance. Besides a mosquito research project the Parliamentary report dealt with an arbovirus study by the Bombay Natural History Society in collaboration at various times with WHO, US Army and the Smithsonian Institute; an Ultra-Low Volume (pesticide) spraying technique in Jodhpur purportedly to deal with urban malarias; a microbial pesticide project in a couple of agricultural universities purportedly to find a natural alternative to agricultural pests and research by Johns Hopkins Centre (PAC p. 1, 7).

In 1963, soon after the 1962 Sino-Indian war the VRC did a study through serological tests of the immune status of man and animals in the Northeast Frontier region bordering India and China and also examined ticks etc. in the area. Research also had been done at VRC on dengue, KFD and Japanese Encephalitis all which have been considered as potential BW agents in published literature on the subject. The VRC under the Rockefeller Foundation had always been careful not to engage itself directly in several areas of BW interest. In 1964, it got interested in certain biological research with monkeys. But it avoided direct presence in the work. The Rockefeller Foundation sponsored a Japanese university

ISSN: 0019-5138
DOI: https://doi.org/10.24321/0019.5138.202149

team to collaborate with the Karnataka University in south India to carry out the work on monkeys.

9. The decision to set up a bird ringing centre in the Ran of Kutch near the Pakistan border was taken by a WHO scientific group which met in Geneva in March 1959. The study on the migratory birds moving into and out of India and also to find out their role in dissemination of arthropod borne viruses. The expenditure for the survey of bird ringing stations was borne by the Rockefeller Foundation and the BNHS was to ring the catch and identify the birds. The blood sera of the birds and ticks mites and parasites found on the birds were turned over for analysis to an US Army Lab, migratory animal pathological survey (Bangkok) of the US Armed Forces Institute of Pathology.

The role of migratory birds in BW was apparently realised by the US BW researchers in the 1960s. The Agency studying this aspect was the Migratory Animal Pathological Survey (MAPS) of the US Army with its South East Asian headquarters at Bangkok. Besides MAPS various medical research units of the navy studying bird migrations and local infectious diseases in the Middle East and Far East have also contributed to CB research and Development programmes (SIPRI, Vol. II, p. 210). The US Army was so much aware of the birds' role in BW that when they tested their BW weapons in the Pacific in the 1960s the army conducted with the help of Fort Derrick preliminary studies to find out if migratory birds would carry BW agents far away from test zones and into populated areas (Ibid, p.210). A BW researcher who resigned from his job had admitted that once he was asked by a US chemical corps man if he felt that minute particles of some substances may be transported to Siberia on the feet of migratory geese (Harsh S, p. 74).

When WHO terminated sponsorship of the project in 1967 MAPS stepped into support the bird watching study. BNHS signed an agreement with MAPS and the Indian Defence ministry gave technical clearance on the ground that it did not involve visits of Indian or foreign scientists to forward or sensitive areas. This time the BNHS study involved not only soviet birds arriving at the west coast but also birds from china. The MAPS sponsorship continued for two years but ended. Was it a mere coincidence that the end came after the exposure in the US press that similar bird studies by MAPS in Brazil conducted since 1952 was part of BW research [(Small WE, Scientific Research, 1968, p. 27)]. When MAPS withdrew the BNHS project was taken over by the Smithsonian, a civilian organisation, whose connections with the military in the CBW programme soon became public knowledge. The Smithsonian was handling project "Pacific Bird" launched by the US and over which the Pentagon had spent $2,120,000 by April 1968. The Sunday Times London (April 28, 1968) reporting the project said that secret efforts were being made to find a place where CBW agents can be tested with relative safety to humanity. Ostensibly the operation was to study the migratory habits of birds in the Pacific. But one factor tended to give the whole business a less innocent appearance. The project was being substantially funded and directed by Fort Derrick where officials admitted that the "entire project" is classified (Cockson J, Nottingham J, p. 90). The Smithsonian involvement was officially admitted during April 21, 1969 hearings of the US congressman McCarthy RD, whether the army saw an conflict in making a purely civilian institution like the Smithsonian to do work that might conflict with the institution's activities abroad, a defence spokesman replied "The advice of the Smithsonian was sought in identifying a suitable Institution to this (CBW work). The Smithsonian was never asked to do nor did they do any military CBW research" (Biological and Chemical Warfare policies of the US, p. 358).

10. One of the most interesting projects from the BW angle conduced (innocently perhaps) by the VRC (now NIV) related to large scale study of ticks, mites and other insect vectors and their complete ecology in the Himalayan foothills. The tick survey was done in all the districts of Kashmir, Arunachal Pradesh, Hill districts of Uttar Pradesh Pindari glacier at 1000-m altitude, Indo-Tibet border, the strategic areas of Ladakh, Sikkim and the hill districts of West Bengal. Mosquitoes and ticks are transmitters of diseases and as vectors they have to be looked upon as having potential military significance. Such use of vector systems has been studied and is known in the US as entomological warfare (SIPRI, Vol. II, p. 38). KFD virus is in fact transmitted by a tick. Apparently because of the BW importance a large scale tick study in the Himalayan hills were proposed by the US Naval Medical research unit (NAMRU). For some reasons the project fell through but reappeared later in 1968 in the form of a research scheme of the VRC. The study disclosed the presence of 60 species of ticks, 60 species of mosquitos' 20 species of fleas, 30 species of lice in addition to sand flies and mites and many of these were vectors new to science [(ICMR Bulletin Vol. 3(1), 1973, p.7)]. The ticks were collected identified, listed and apparently taken to the US sponsoring agency. The areas where the ticks were collected are places where Indian armed forces might have to venture in case of any conflict with neighbours. A fore knowledge of the disease vectors present and their disease potential is a useful knowledge to be offensive. While the study was no doubt a great contribution to the medial entomology it served no purpose to India to the extent that the disease potential of the newly found vectors in these regions has not been studied in India. It is possible that other countries with greater awareness of CBW might have studied this aspect.

ISSN: 0019-5138
DOI: https://doi.org/10.24321/0019.5138.202149

11. The Indian operation of the Johns Hopkins University the leading BW research centre among American universities is a remarkable one. JHU set up CMRT in 1961 and until it wound up in 1975 the Indian government had no full knowledge about the source of its funds apart from a grant from the National Institutes of Health (NIH). Its annual grant was $500,000 but even after a decade of its operation it was never questioned how this money came to the country each year or was utilised. The government had no control over the CMRT until 1970 when the health ministry insisted on clearing CMRT projects. As a rule no Indian was appointed head of CMRT projects. JHU's publicly announced studies included medical zoology, virology, Parasitology, cholera, entomology, filariasis, meningitis and leprosy. But there were also unscheduled projects such as tick collection, animal ecology in Hoogly and study of rhinoceros in the Brahmaputra valley in Assam. The JHU set up a unit for nutrition project in the Punjab at Narangwal close to the Pakistan border and not too far away from some Indian defence installations. The JHU refused to move its nutrition unit from Punjab - India's richest and high food producing states - to Bihar, one of the poorest states where malnourished people are more! The Narangwal project of the JHU was also partly supported by WHO.
12. As soon as the government of India began to show reluctance towards the JHU-CMRT programmes a contingency plan was put into operation to stay in the Gangetic valley area by starting a small programme in Bangladesh and Nepal. When Nepal withdrew support a JHU-CMRT ecologist re-entered Nepal with the US National Geographical Society in a wide ranging expedition. The team expelled from Narangwal, when last heard of, had settled in Bangladesh. Johns Hopkins also made a detailed study to find out what would happen following eradication from a city of Aedes aegypti (AE) a species of mosquitoes on which the US has been showing considerable interest, AE is a vector of the fatal yellow fever disease which exists in parts of Africa and Latin America. It is not present in South East Asian Nations and the Indian subcontinent for reasons not fully clear to public health authorities but perhaps known to BW experts. A promising candidate for BW, yellow fever virus was a standardised (meaning approved from combat use) BW agent in the US arsenal. It was called Agent OJ (SIPRI, Vol. II, p. 37, 38). In Burma the project was financed by Advanced Research Projects Agency (ARPA) of the US defence. In both Kenya an India the research focus has been on yellow fever mosquitoes. In addition to field research using advanced genetic techniques the US has been collecting various AE strains from all over the word and studying their vectorial capacity. The Genetic Control of Mosquitoes research Unit (GCMU) as it was called was wound up in June 1975 following a report by the Public Accounts Committee of the Indian Parliament that the project was no utility whatsoever to India while being of far greater importance to any country which might want to develop effective BW system (PAC, p. 201).
13. It is not for the first time that an American funded medical research project in a foreign country was asked to close down because of suspected CBW activities. In 1960 a left wing group in Japan known as the Hokkaido Committee began a campaign against a US sponsored project being conducted by a nearby forest experiment station. The project was initiated by the Japanese Institute of Health which asked the research group to look into "yeze fever" a fatal; disease caused by a rickettsial virus. The virus is carried by ticks in field mice in the Nabor and Maryana forest areas outside of Nappore in Japan. The Hokkaido committee noted that the members of the forestry team were not unaware of the overall goal of the research nor did they know how much money was available. The funds for the project were extremely generous unlike the conditions obtaining in other research institutes in Japan. The committee later learned from the Institute of health that the project was financed by the US Army. Once this was publicised the members of the forestry station refused to cooperate in the experiments. Seven years later in May 1967 American research once again came under attack in the Japanese Parliament at the hands of the socialist members of the upper chamber who charged that Japanese recipients of the aid were indirectly cooperating with the US Army's research on BW. Education minister Toshihiro Kennakt agreed the practices of the US grant were questionable and promised to investigate. The US Defence department countered by saying that the support was meant for basic medical research and although of interest to the US Army "it is related to the health problems of Japanese" (SIPRI, Vol. 1, p. 247) considering the intelligence that the American military had gathered about Japan's research with yellow fever. "Once researchers at Camp Detrick had access to the results of the Japanese experiments they went to work on finding means of weaponising the disease. Scientists saw two possibilities: infecting mosquitoes with the disease by the millions could be released on unsuspecting population or finding a way to spread the disease by means of aerosol spray". By 1960 America had a formidable yellow fever arsenal that had the capability to wipe out entire countries" (Yellow Fever, Dickerson J, p. 199).

ISSN: 0019-5138
DOI: https://doi.org/10.24321/0019.5138.202149

14. GCMU came into being in 1969 as a WHO-ICMR (Indian Council of Medical Research) project. It was funded by the PL-480 money with the US embassy, appropriated by the USPHS, which not only supplied or approved the project leaders but also determined the unit's activities and priorities. The work of the unit involved thorough study of the ecology of mosquitoes rearing and releasing of thousands of mosquitoes in the field and mapping of towns and villages they are to be released. The mosquitoes were either sterilised or incompatible with local females. Also genetically manipulated mosquito strains were brought from the US and released in India. The knowledge gained from the ecology, artificial dispersal and release of genetic strains Aedes aegypti (the Yellow Fever mosquito) of great significance in the field of BW known as entomological warfare (Steven and Ross, p. 52). There are numerous references in published literature to the use of mosquitoes and other insects in BW. The Japanese successfully conducted field trials of fleas spraying from aircraft during World War II (SIPRI, Vol. I, p. 114, 115). The German station at Posden conducted experiments on the feasibility of using insects to attack enemy animals and crops (SIPRI, Vol. 1, p. 223). The employment of vector weapon system is known in the US as entomological warfare. Such a weapon system consisted of a container for delivering the vectors: infected mosquitoes perhaps to the target area and then releasing them over it (SIPRI, Vol. II, p. 28).
15. The entomological warfare programme started in the US in 1951 at the Ft. Detrik Laboratory. Several devices including frangible bomblets known as entomological bombs were developed for dispensing infected arthropods. The US tested an unidentified vector system on Baker Island in the pacific in 1965 (SIPRI, Vol. II, p. 81). As carriers of BW agents like viruses the use of arthropods like mosquitoes has some advantages. Such infected arthropod is a minute self-dispersing weapon BW agents can be sprayed from aircraft but they have to be inhaled to be effective. They may be destroyed by heat, rain, the sun's ultra-violet radiating and winds may throw them off target. However if the virus is carried by mosquito heat or rain will not affect it. Furthermore since mosquitoes bite people the BW agent can be introduced directly into blood (SIPRI, Vol. II, p. 126). But this use of mosquitoes in BW is possible only if their behaviour ecology and dispersal are known beforehand. Such information was becoming available through GCMU particularly from its studies on Aedes aegypti the yellow fever mosquito.
16. Besides the GCMU, the USPHS was also involved in another mosquito project in Jodhpur where certain BW hardwire was used for spraying insecticide purportedly to eliminate malaria mosquitoes. The ultra-low volume (ULV) technique which converts DDT or any other pesticide into sprays of minute invisible droplets is hardly different from the one used to aerosolize BW agents (SIPRI, Vol. II, p. 284) and Jodhpur, chosen for this experiment is one of the few cities in India with the highest temperature and lowest humidity - climatic extremes favouring aerobiological research with aerosolized agents - but one with relatively low malaria incidence compared to other cities and towns nearby.

In the US all foreign collaboration in science is done with the knowledge of a nodal agency at the state department. So is the case with Canada. In the user, the State Science and Technology Committee (GNTK) staffed with KGB officials regulate and coordinate basic scientific research in consonance with the policy directives from the Central Committee. Also in the US, the National Academy of Science is in close liaison with state organs but also has the necessary independence to assess things. In the Soviet Union, the Science Academy is very independent and is able to deal with the Politbureau and the Central Committee.

17. In August 2000, flash flood killed more than 70 people and damaged around 100 bridges. The valley is being threatened by flash floods on an average of once in four years now after 1993. Satellite pictures showed the presence of huge water bodies or lakes up-stream of Sutlej and Siang River and no warning came from China. 120 km of a strategic highway (China sector) was washed away in this year 2000 flood. It is still a mystery for Indian geo-scientists. 50 villages in Sutlej are presently threatened by a reported landslide in Pareechu River in Tibet. The river is a tributary of Sutlej. The satellite pictures show that a lake exists of nearly 200 hectares which was of 150 hectares on August 6th, and volume of water is around 100 million cubic meters and is 60 meters deep. Lake's water-level is rising by several centimetres per day. Himachal Pradesh government on suggestion of the Chinese government has alerted downstream 350 villages fearing a 50-100 feet tidal wave. If the dam burst occurs, greatest economic danger is to the six units (each unit productivity 250 MW) of hydro-electric project of Nathpa-Jakhri project of Rs. 8500 crores of Sutlej Jal Vidhyut Nigam. The project provides nearly 30% of northern India's power grid. Press reports indicate that the Chinese authorities did not permit the Indian experts to visit landslide site. Our remote sensing satellites have also failed to locate landslide blocking of the river Peeruchu till the Chinese informed us on August 11, 2004. Of course, the Chinese could have used controlled tunnelling of the dolomite rocks for early seepage of water before the increase of volume

ISSN: 0019-5138
DOI: https://doi.org/10.24321/0019.5138.202149

of the temporary lake. Even if the danger is postponed this year, dam stability cannot be guaranteed for future.

18. It would be difficult to distinguish between natural and man-made catastrophes in Tibet. The key to geophysical warfare of the 21st century lies in identifying critical natural instabilities which can create devastating results to other countries by experimenting with addition of little energy to unleash vast amounts of energy. Tibet is strategically located for such earthquakes and weather modifications to the disadvantage of India. Specifically, we must recognise that steep valleys of Himalayan Rivers can make our civilians suffer and destroy power projects, if China desires to take strategic advantage of geophysical, geographical and topographical parameters. The danger is real, in 2020s with China behaving aggressively on our borders in Ladakh. We may have to face future catastrophes of landslide dams and possible environmental war-fare.
19. Declaring the "ever increasing threat of bio-terrorism" as a matter of "serious concern" India had proposed to set up through legislation an autonomous Agricultural Bio security Authority "with capabilities to prevent, detect, and respond" to threats to Indian agriculture and also to deal with transboundary diseases such as the avian influenza. The Bill Introduced in the Lok Sabha sought to bring together the plant, animal and marine protection and quarantine under a single umbrella with adequate powers including to declare bio security emergency in case of disease outbreak. According to the Ministry of Agriculture which introduced the Bill, with the liberalisation of global trade in agriculture there is an increased risk of introduction of exotic pests and weeds while introduction of genetically modified organisms "require proper risk assessment and management." The new legislation will replace outdated laws - Destructive Insects and Pests Act, 1914 and the Livestock Importation Act, 1898 - introduced under the British rule. C. N. R. Rao, who headed Prime Minister's Science Advisory Council says he is happy that progress at last was made to set up the Authority that his council recommended five years ago. The Authority will utilise expertise existing in various scientific organizations including the defence establishment. Pugwash conference in Madras in January 1976: monsoon dependent country is in the shadow of danger of drought weapon. It has been demonstrated by project white tops that if clouds are seeded in a particular manner with silver iodide rain decreases significantly upwind.
20. IMD-US agreement sharing weather data Nature 391, 109 (8 January 1998): After more than a decade of refusing to do so, India has agreed to share with the United States weather and atmospheric data gathered by its INSAT geostationary satellites over the Indian Ocean on a "near real-time basis". But it has stipulated that the United States should not disseminate the Indian data to a third country without its consent. ICRISAT radar to system to track birds but really would be useful militarily Radar is being used at the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) in India to study the migration of flying insects, especially Heliothis armigera or pod borer, which causes considerable damage to chickpea, pigeon pea, cotton and other crops. A team of British scientists from the radar unit of the UK's Tropical Development and Research Institute is conducting the studies which they hope will eventually lead to the control of the pests
21. The Nefarious Chinese Games: The lake burst could be environmental weapon, says expert New Delhi, Aug. 14 (pti) - The threat of a lake burst in Tibet portending catastrophic flood in Himachal Pradesh has exposed India's vulnerability to environmental warfare where nature's forces are manipulated to become deadly weapons In the present case, Indian government woke up after a warning from China on August 11. Indians do not know what is blocking the Pareechu River that has created the artificial lake but China has said rocks from a natural landslide caused the blockage. "This may very well be true, but whatever the cause, the lake burst offers China a test case to study the effect of this new kind of environmental weapon - a lake bomb," the defence scientist told PTI on condition of anonymity. Historic Himalayan ice dams created huge lakes and caused mammoth floods in India, according to new research which suggests that the Himalayas is not all that environment friendly. Ice dams across the deepest gorge on the Himalayas created some of the highest-elevation lakes in history. The most recent of these lakes, in the Himalayan Mountains of Tibet, broke through its ice barrier somewhere between 600 and 900 AD, causing massive torrents of water to pour into India. Geological evidence points to the existence of at least three lakes, and probably four, at various times in history when glacial ice from the Himalayas blocked the flow of the Tsangpo River in Tibet, according to University of Washington geologist David Montgomery, a professor of Earth and space sciences. Carbon dating shows the most recent lake, about 780 feet deep, burst through the ice dam between 1,100 and 1,400 years ago, rapidly draining some 50 cubic miles (200 billion cubic metres) of water. The second lake, more than 2,200 feet deep, dates from about 10,000 years ago, and likely held ten times more water. When that ice dam broke, it caused one of the greatest floods on Earth since the last ice age, according to the US study.

The new evidence indicates that several times in the

ISSN: 0019-5138
DOI: https://doi.org/10.24321/0019.5138.202149

Tsangpo's history, moisture from strengthening monsoons built Himalayan glaciers into huge ice dams, stopping the river before it could leave Tibet. A group of researchers led by Montgomery found evidence of the resulting lakes in ledges carved into the sides of the Tsangpo gorge. The group presented evidence of repeated damming and flooding of the Tsangpo gorge at the American Geophysical Union meeting in San Francisco. P. M. Bhargava: "I have always maintained that BWs would be the weapons of mass destruction in the future because as they would be easy to manufacture store and deliver. "It is important that India prepares itself adequately to take care of this possibility," the founder director of the Centre for Cellular and Molecular Biology here said in a statement.

DSS Project: Structure of the Kashmir_Himalaya_from_deep_seismic_soundings_expt: Are you asking whether the explosions done to carry out these studies, triggered earthquakes at remote location. If so, then I would say, not to my knowledge. Lots of people speculate that such blasts can lead to remote (or nearby) triggering of earthquakes. But a very few of them have actually demonstrated this through mathematics. I agree that the waves caused by such blasts can destabilize (or stabilize) a fault which can lead to occurrence of an earthquake. But are these waves strong enough to destabilize a fault at remote distance. What is the lower threshold for triggering? How do we quantify it? I quantify it in the following way. If the magnitudes of stress changes caused by these waves are stronger than that of the tidal waves (sun and moon) at remote locations, then I would say that they are capable of earthquake triggering, otherwise NO. Tides are known to trigger small earthquakes (not large) in critically stressed regions. Actually this idea has hampered lots of research work in the Himalaya and now there is no way we can use explosives to image the subsurface structures under the Himalaya.

In 1786, a Land Slide Dam on River Dadu in China burst causing a flood that extended 1400 km downstream and killed over 100,000 people One such incident in recent times was the Phuktal River LSD which was formed around 31 Dec. 2014 and was successfully managed by the Expert Team created by the NDMA with not a single loss of life or livestock A landslide has occurred blocking river Phuktal in Zanskar Valley, Kargil District of Jammu & Kashmir.

ISSN: 0019-5138
DOI: https://doi.org/10.24321/0019.5138.202149