

deposits free of international regulation.

The deeper deposits, such as those off the Galapagos Islands, will create more of a problem. The deep sea mining bill passed by Congress two years ago was designed to provide US mining companies with certain rights that would have to be recognized in so-called "grandfather clauses" in any international treaty, since the latter would require ratification by the US Senate.

This law would require amendment in several places. For example, "hard mineral resources" are defined as any deposit or accretion of "nodules" lying "on, or just below, the surface of the deep sea-bed". Similarly the deep sea-bed is defined as including the subsoil "to a depth of 10 metres", while polymetallic sulphide mineral deposits may extend considerably further.

State Department officials are confident that, with the amendment of certain key definitional provisions, the act can be extended to cover the sulphides. There is much less confidence about the implications of the Law of the Sea negotiations, which Mr Otho Eskin of the department's Office of Oceans Law and Policy says raises "a very serious question".

Accepting that fundamental changes are unlikely to be agreed by the negotiators when they meet again in New York in March, and that a treaty in some form is likely to be adopted by the end of the year, the United States has two main alternatives. Either it could sign the treaty (which would be taken as a symbolic victory by the developing countries, for whom the treaty represents the first concrete manifestation of the "New International Economic Order"); or it could refuse to sign (which could jeopardize the chances of United States-based mining consortia obtaining the necessary loans from the multinational banks).

David Dickson

Indian agriculture

Cattle go West

Bombay

India's ambitious programme of cross-breeding its cows with foreign bulls is endangering the country's agriculture by creating a shortage of draught animal power — the mainstay of farming and rural transport in India. This is the finding of a survey covering the cross-breeding programme in 18 of the 22 Indian states carried out by the Bombay-based All-India Agriculture and Cow Protection Society (AIACPS) founded by Mahatma Gandhi four years ago.

A five-member team of veterinarians headed by Dr M. Y. Mangrulkar contacted over 1,600 cattle breeders and government crossbreeding farms for the survey. Their report just published says that the craze for "westernization" of Indian cows has resulted in the neglect of indigenous milch strains of cattle and has

led to shortage of good, sturdy bulls for farming operations.

The survey has revealed that exotic crossbreeding has mostly produced bullocks which are uneconomical. The exotic animals need special grade grass and oil cake feeds and are unsuitable for the rigours of Indian agriculture: they get easily tired and are unable to walk in the sun or plough in wet fields, unlike the docile native bulls which live on paddy straw and are at ease in dry and irrigated fields. More importantly, the exotic crossbred males have no hump and the traditional ploughs do not fit on them. Thus the crossbred bullocks have been left to starve and die or been sent straight to the slaughter house. The AIACPS report says the crossbreeding programme, mostly financed by international agencies, is actually preparing India to become the world's leading exporter of beef to the meat hungry West. The slaughter of male calves is leading to a shortage of bullocks particularly in Bihar state where, the report says, thefts of bullocks are increasing.

In states such as Karnataka, crossbreeding has been in vogue since the 1950s but other states have taken to crossbreeding in the past two decades and the



programme was vastly expanded in the early 1970s under the World Bank financed "Operation (milk) Flood". According to the survey, the high pitched crossbreeding programme is weaning the countryside away from indigenous cattle in favour of Holstein-Friesians, Jerseys and Red Danes, and good Indian breeds are being replaced with unproductive crossbreeds.

The programme has led to the import of bulls, semen, vaccines and insemination equipment but has failed to increase milk production. The hybrid cows after second calving yield less milk than the high-yielding native breeds such as Kankrej, Sahiwal, Gir and Haryana. The survey also revealed that exotic crossbreeds are more susceptible to disease than native stocks, which has led to increased import of vaccines.

However, government officials maintain that the survey findings are at variance with their own evaluation. According to Dr R.M. Acharya, deputy director general of the Indian Council of Agricultural Research, Indian cows are not being westernized wholesale. "Only five per cent of the cattle population is exotic", he says and, the humpless crossbred bullocks are gradually becoming adapted to Indian

conditions and their number in farming operations is steadily increasing. According to Dr Acharya the crossbreeding is not new to India where all the military farms have been using exotic breeds for several decades. While India has indeed some good breeds, according to Dr Acharya, only a small per cent of them are really high milk yielders. Despite the controversy officials maintain there is no alternative to exotic crossbreeding for increasing India's milk production, which is currently estimated to be 23 million tonnes annually.

K.S. Jayaraman

Bridging the Indian gap

New Delhi

Mrs Indira Gandhi, the Prime Minister, announced last week a substantial increase of support for science and technology. The increase will amount to more than 50 per cent in this next five years. Mrs Gandhi, always sympathetic to science, has accepted a proposal put to her by Dr M. S. Swaminathan which is intended to strengthen government and university laboratories and to improve the quality of research.

Two new technology boards set up by the Indian government could ease the problem of high unemployment among India's scientific and technical personnel and give a new thrust to biotechnology research in the country.

A National Science and Technology Entrepreneurship Board is to be set up which will seek institutional credit for the 300,000 such unemployed persons to enable them to set up self-employed units. Surveys will be conducted to identify the areas in the country with development potential requiring scientific and technical support.

While some areas have a surplus in scientific and technical manpower (mainly due to unemployed polytechnic graduates or postgraduates) other areas are experiencing critical shortages. For instance, although there are about 4,000 vacancies for teachers in polytechnics in the country, suitable candidates are not available.

The Indian government has also decided to set up a biotechnology board to coordinate the functioning of biotechnology organizations in the country. Its purpose will be to utilize new concepts in biotechnology in agriculture, industry and medicine.

Mrs Gandhi said at the National Science Congress, India's biggest annual gathering of scientists, held in the southern city of Mysore on 3 January, that biotechnology was a frontier area of science, and that the country must take advantage of the latest technologies which could enable India to bridge the intermediate stages.

Sunil Saraf