Submission No 4

Inquiry into Australia's relationship with India as an emerging world power

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CSIRO submission

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Historical Relationship

CSIRO's relationship with India dates back to the inception of CSIRO (albeit in its original inception - CSIR) in 1926. For example, in 1927, CSIRO began discussions with the Imperial Agricultural Research Institute of India regarding biological mechanisms that might be suitable for controlling the infestation of the Buffalo-fly in northern Australia.

Whilst the focus of our interactions with India has fluctuated since then, our interactions have covered the full spectrum of CSIRO's research capabilities and have ranged from exchange visits, information sharing and investigating problems of mutual concern, to participation in multilateral fora. Many of our interactions have been supported by the Australian Centre for International Agricultural Research (ACIAR).

Exchanges between CSIRO and India have also been of great value to the relationship, particularly where they have led to some form of permanent link between individuals and institutions. Numerous Indian scientists visited CSIRO under the Colombo Plan, and through UNESCO and FAO Fellowships. Participation in these exchanges provided both CSIRO and India with the opportunity to form stronger relationships, to learn more about each other and often led to further contact. For example, following the two year exchange under the Colombo Plan by Mr G Swarup, CSIRO provided superseded radio astronomy equipment to the National Physical Laboratory in India in 1955.

The Indian model for administration of space related activities was used as a model when CSIRO's Office of Space Science and Applications (COSSA) was established. Building on these links, CSIRO signed a Memorandum of Understanding with the Indian Space Research Organisation (ISRO) in 1987. While the initial high expectations from this MOU were not achieved, primarily as a result of lack of funding, CSIRO has maintained links with ISRO.

Collaboration in radio astronomy has been long-lasting and productive with, for example, Australian researchers designing antennas for the Indian Giant Metrewave Radio Telescope (GMRT) radio telescope, regular exchange of observing time on Australian and Indian telescopes, and two Directors of the Raman Research Institute having been appointed from CSIRO staff.

Current Relationship

India now ranks 12th in the world in terms of the number of international interactions with CSIRO over the last four year period, with an average number of 32 activities per year. These include Agribusiness; Environment and natural resources; Radioastronomy; Manufacturing and construction; and Minerals and energy. Examples of some of these collaborations are provided later in this submission.

CSIRO's interactions with India have gained momentum since Australia first signed a Science and Technology cooperation agreement with India in 1975. Since that time CSIRO has moved to strengthen its relationship with India through the establishment of a number of more formal mechanisms. These include:

- An exchange of letters in October 2001 with the Indian Council of Scientific and Industrial Research (CSIR) which facilitated an exchange of two visits per year between CSIRO and CSIR for the years of 2002 and 2003.
- MOU with India's Department of Biotechnology in September 2004 to strengthen cooperative efforts in the area of biotechnology.
- The signing of a Relationship Agreement between the Singareni Collieries Company Limited and CSIRO in February 2006. This Agreement enhances CSIRO's relationship with key India groups in the area of mine gas management - a strategic area also associated with mine safety.

In 2003, CSIR, along with CSIRO and seven other international research organisations, established the Global Research Alliance (GRA) which aims to facilitate international research and development cooperation

in an effort to address the problems facing the world especially in the areas of water, health, energy, transportation and digital divide.

CSIRO continues to collaborate with India in a variety of ways, including through one to one interactions on specific projects, information and staff exchanges, as well as in broader multilateral contexts – both on specific projects or in multilateral forums.

In recent years, these collaborations have included:

- A project to develop specification and "processing prediction" technologies for the Chinese and Indian Wool Industries, using knowledge of fibre properties to predict yarn quality and spinning performance. As a result of this project, mills in India and China are now able to benchmark against global best practices and to compare their performance against others.
- India is a member of the Partnership for Observation of the Global Oceans, POGO. This is a forum created by directors and leaders of major oceanographic institutions around the world to promote global oceanography, particularly the implementation of an international and integrated global ocean observing system. There is close cooperation between Hobart and Goa.
- A project with the National Metallurgical Laboratory, India to develop a model of heat transfer within a coke oven, calculating the time history and spatial variation of temperature based on the composition of a coal blend, oven design and operating parameters.
- A project with the Central Leather Research Institute (CLRI), India to develop, evaluate and widely apply practical, viable systems to eliminate or reduce salt use in hide and skin preservation and processing in order to significantly reduce salinity of tannery effluent.
- Both India and Australia are members of the International Square Kilometre Array radio telescope Consortium, with Australia's SKA efforts being coordinated by CSIRO. Collaboration between India and CSIRO on SKA-related matters includes work on antenna design, an experiment to search for radio signals from the early Universe, and potential collaboration on a Low Frequency radio telescope to be sited on Australia's candidate SKA site.
- In collaboration with India's National Dairy Development Board (NDDB) and the National Institute for Animal Nutrition and Physiology (NIANP) the development of feed supplements for cattle that provides cattle with a protein source which adds value to the nutritional quality of their diet. Results indicated that milk production capacity of India's dairy herd could rise by millions of litres a day.
- The pasture legume, *Stylosanthes* plays a vital role in mitigating fodder shortages, improving soil fertility under agropastoral systems, and in the restoration of degraded lands, and is the most important tropical legume for semi-arid and arid regions in India. However it is threatened by *Anthracnose* disease. This project aimed to select germplasm with improved *Anthracnose* resistance, herbage and seed yield for adaptation in contrasting agro-ecological regions, and to develop a genetic map for *Stylosanthes* as a basis for the development of cultivars with high yield, persistence and multiple sources of resistance. As a result of this project, the scientific base has expanded considerably for continued and targeted improvement in *Anthracnose* resistance in *Stylosanthes* in China, India and Brazil. This will greatly assist the livestock industries of these countries.
- CSIRO, Agriculture Western Australia and the Bureau of Resource Sciences collaborated with the BAIF Development Research Foundation in India to Develop and standardise diagnostic tests and vaccines for the control of sheep and goat pox diseases (capripox viruses) in India and Australia. The potential for economic damage to Australia from this disease is considered to be second only to the threat of foot-and-mouth disease. The knowledge gained from this project will not only enhance disease control in these countries, but will also boost Australia's preparedness to combat any outbreaks in Australia.

- A collaboration with the Central Arid Zone Research Institute in India to apply and adapt Australian-developed techniques for assessing land degradation to the Indian desert environment, using remotely-sensed data; to gather ground-based survey data on socio-economic factors, the natural resource base and animal production for interpreting the results of remotely sensed analyses; to develop means of information exchange with village communities in order to explain land degradation; and to develop capacity with Indian colleagues for their independent use of all methodologies.
- The identification of Helicoverpa resistance in wild chickpeas with the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT).

CSIRO continues to explore collaboration ideas with India, with current proposals under consideration in areas including water; forestry; ICT; climate change; astronomy and agriculture.

Commercial Interactions with India

CSIRO has had a number of positive commercial interactions with India, including granting a licence to the Indian company United Phosphorus Limited (UPL) in 2000, to produce and market the CSIRO developed portable phosphine fumigator developed in CSIRO's Stored Grain Research Laboratory. UPL is the largest producer in India of crop protection products that include fumigants, fungicides, insecticides, rodenticides and herbicides, and ranks fourth amongst the generic agrochemical companies in the world.

In November 2005, CSIRO and Infosys, India's second largest ICT company, signed a cooperation agreement for research and development in information engineering and commercialisation of CSIRO's intellectual property. Through this agreement CSIRO will be able to take advantage of Infosys' presence in 17 countries (including two offices in Australia—Melbourne and Sydney) to assist with the distribution of CSIRO's intellectual property to global markets. Infosys has also licensed CSIRO's Panoptic Search Engine enabling Infosys to evaluate Panoptic for integration within Infosys's financial applications. CSIRO and Infosys are also planning to work together to commercialise CSIRO's mobile search technology.

The Australia-India Strategic Research Fund

The announcement by the Prime Minister on 6 March 2006 that the Australian Government would allocate $25million over five years for the establishment of an Australia-India Strategic Research Fund is warmly welcomed by CSIRO and will provide greater mechanisms for interaction. This funding commitment and the associated strengthening of bureaucratic ties between the two countries should help to overcome some of the past impediments CSIRO has faced in collaborating with India, which include a lack of funding (from both countries), concerns regarding Intellectual Property Protection and bureaucratic difficulties. As a result of this announcement, CSIRO is already in discussions with Indian colleagues about further collaborations in the areas of water research; ICT; forestry; climate change; astronomy and agricultural research.

The strategic possibilities for both nations resulting from increasing globalisation and regional imperatives

CSIRO is collaborating with Indian counterparts on a number of issues of importance to the region. These include:

- Projects aimed at increasing the living standards in India, from which the knowledge gained will be available for use in other countries in our region as well as domestically.
- The development/enhancement of a Tsunami warning system.
- Various issues of environmental significance.
- The development of a satellite-data distribution system for the region in support of disaster prevention and response, called "Sentinel -Asia" by the "Asia - Pacific Space Agency Forum" (which includes ISRO, CSIRO and other regional space agencies).

Collaboration in the energy and water domains could also form a major focus for research interaction between Australia and India. In the energy domain, recognising that both countries have significant coal industries, this could include cleaning and blending of coals to enhance power station performance as well as newer energy technologies for reducing greenhouse and other emissions to the atmosphere. In the water domain, this could include the use of groundwater storage for water reuse and managing contaminants in aquifers.

In addition the continuing interactions between CSIRO and India are a valuable mechanism for further enhancing Australia's cultural and economic ties with India.

Conclusion

CSIRO is enthusiastic about future interactions with India and is seeking to move beyond the successful scientist-to-scientist project level interactions of the past into longer term strategic investments with partner organisations in India. To this end, CSIRO is currently exploring mechanisms for further strengthening the linkages between our two countries.

CSIRO is buoyed by the recent creation of the Australia-India Strategic Research Fund. The fund will be a valuable mechanism for CSIRO and partners in India to deepen and broaden existing collaborations and partnerships, as well as providing opportunities to focus old linkages and providing stimulation for new interactions.