Summarized Transcript of Second Network Conference on *Botanical and meteorological history of the Indian Ocean, 1600-1900*

Delhi meeting: JNU August 30th-31st

Session 1.

Indigenous Sources for the Study of Environmental History of India

After welcome speeches from Network directors, Dr Vinita Damodaran (Sussex) and Prof. Deepak Kumar (JNU) the first session of the day – chaired by Sucheta Mahajan of JNU – looked at the use of indigenous sources in the study of the environmental history of India.

Prof. Dipti Tripathi, Director of the National Manuscript Mission spoke on traditional Indian knowledge systems. Attention was drawn to the congruence to be found between the network's professed interdisciplinary approach and traditional Indian approach which emphasises the interdependence of all things and the oneness of universe, undivided into separate categories of human, animal, plant etc., and how all are continuously interacting manifestations of one cosmic consciousness. Many of the current problems facing humanity are – within this system – seen as a product of humankind's failure to appreciate its own interconnectedness and therefore the necessity of living in harmony with the earth and its other inhabitants. It is this illusion of separateness and with it the desire to dominate which leads to destructive behaviour. It is noted that central to this system is the belief that matter is created out of consciousness, this matter then must live in harmony with that consciousness in order to avoid disruption. Vedic traditions have long understood the interconnectedness of nature and as a result hold that intellectual projects must be considerate of the implications of its implementation in the widest possible sense if they are to be successful. This system holds that rather than teach all members of society the value of maintaining ecological balance it is preferential to engender respect for the environment in society as a whole through religious beliefs and social systems. The depiction of trees as gods and rivers as mothers are given as examples of these types of belief, which work to protect the environment and which are under attack from 'scientific' thinking. While this particular system is not seen as perfect or even preferable, it is seen as effective in a way in which 'scientific' explanations are not.

On the subject of indigenous sources themselves Prof. Tripathi alerted the conference to some indigenous texts which were seen as of particular value. Ancient Vedic texts are noted as containing work on and predictions of rainfall patterns, falls of hail, floods and earthquakes, in questions it is noted by Dr Damodaran that these sources are generally unstudied. Though many of the original manuscripts have disappeared they are rendered visible through their mention in other texts. It is noted that many of the more modern texts, those relevant to the specific time period considered by the network are published and readily available.

Session 2.

Archives and Holding Institutions

Chair: Neeladri Bhattacharya

Penny Brook, Antonia Moon (British Library); Jaya Ravindran (National Archives of India); B. Venugopal (National Museum of Natural History); Paramajit Singh (Botanical Survey of India); Fr. George Gispert-Sauch (Jesuit Archives at Vidyajyoti)

Speakers from the British Library began by highlighting the British colonial view that India's

tropical climate was damaging to the health, the perceived significance of climate for the health of soldiers and colonial administrators effected many important decisions. It is therefore noted that medical records represent an often overlooked source of information on the climate history of the colonial era. Many such sources are to be found in the India Office records at the British Library others in private collections, some of the BL sources are now fully digitised and available online. Medical topography surveys, which were undertaken to ascertain the suitability of a certain area or region for settlement are of particular value and were very common throughout the C19th. In the early period these topographies focussed on rural areas, in the later period surveys of cities and other urban environments were also made. These surveys include measurements of atmospheric data, rainfall, temperature and winds plotted over the course of a year, micro-climates were observed and recorded by conducting a number of surveys at a few miles separation. The perceived centrality of climate means that useful observations are found throughout reports made by medical officers all over India and East Asia, here discussions also extend to the recent past, particularly where extreme weather events are concerned, epidemics are often attributed to unusual conditions such as heavy rains or thick fogs which are therefore recorded. The annals of Indian Medical Science are noted as of yet unknown potential as records of climate data, the commissions of enquiry on medical subjects are noted as the most comprehensive of such sources, one report, the Royal Commission on the Sanitary State of the Army India,1861 includes a 200 page appendix made up of near complete climate data for an extended period preceding that year. Also of particular interest may be the Leprosy Commission of 1890, the Medical History of the British in India project at the University of Scotland has digitised this and many other similar reports. Proceedings of the Madras Sanitary Commission and other such devolved commissions from across India contain less complete but still very useful information. Reports of army medical officers are similarly important. The particular value of these types of sources is that they present climate data in context, discussing the effects and experience of climate rather than just numbers.

Penny Brook discussed the *History of Cholera in India 1862-1881,* held at the BL which focusses on the relationship between weather and prevalence of cholera and contains not only climate records but detailed information on the perceived impact of such variations. In more general terms it is noted that particular collections held within the BL's India office archives; the printed collections, board collections, proceedings, official publications and private papers are all of great value in terms of recovering environmental data. James Jameson's report on earlier outbreaks of cholera makes mention of weather conditions as well as other environmental events such as earthquakes, storms and floods. Reginald Orton's text is described as 'a goldmine' of information on climate and the repercussions and perceptions of climate in early C19th India. The cholera outbreak of 1817-1819 raised great concern and therefore receives regular mention across different types of sources. Lastly the prevalence of Indian and Arabic language sources – yet to be digitised – in the BL archives is reported.

Jaya Ravindran (National Archives of India) described how since its foundation in 1891 as a resource available only to government officials, the National Archive as become progressively more open in terms of access, to the stage today where members of the public are able to view materials stored there. Recent years have seen significant increases in requests for climate type sources, which are abundant for most urban areas from the mid-C18th onward. Such records are comprised of those left by the East India Company, the British administration and the post-independence Indian government. Many of the British and post-independence records are divided by ministry. There are also significant holdings of Dutch records stretching from 1600-1900 held on microfilm. Many records contain complex and detailed information on plants, plant distribution and transfer, often divided by use into agricultural, medical, fibres and silk, forestry and other categories. Records reveal the centrality of ideas of environmental improvement via plant transfer to the colonial mind-set and reveal how the project's focus shifted from the collection of plant species at European centres such as Kew toward transfer between networks of botanic gardens and plantations

around the empire. In this period plant transfer was accompanied by the movement of people who carried expertise in specific plant husbandry so as to ensure the well-being of specimens and the success of agricultural ventures. Toward the end of the C19th cash crops and medicinal plants came to dominate imperial plant transfer, widespread experimentation took place to determine the most profitable environment for the cultivation of cash crops, most notably coffee, the records of such experiments are held in the National Archive and contain a great deal of information on climate, plants and botany in relation to the imperial administration and wider project.

Many records are relevant to the study of particular, noted botanists, though it is observed that the arrangement of sources by governmental department can make such a personality based study difficult. Records of botanical gardens as well as the reports of the Botanical Survey of India from 1925-1951, which include huge quantities of botanical sketches, specimens and seeds are also held. Micro-films of factory records represent a significant resource for the earlier period reaching back as far as 1600. It is noted that the Home Department was always responsible for government action in the first instance, when the work load increased a dedicated department would be formed, in 1871 the agricultural department was founded it is therefore noted that before this date, materials relevant to such study can be found within the Home Department records. Cartographic records donated by the survey of India provide an as yet unexploited opportunity for comparative studies of forests, rivers and of other environmental features. These maps are in the process of being digitised. Railway records are seen as a particularly useful source of rainfall records, each station took regular measurements which are available at the National archive. Finally the lack of subject guides for National Archive holdings was noted, it was suggested that the involvement of universities might be a suitable route to the creation of such guides.

During questions it was also reported that the National Archive held much that related to more subjective issues, social surveys as well as medical reports, military reports, letters and diaries, proceedings of the Survey of India, many of which had been destroyed in British holdings. A previous project cataloguing private collections is also noted.

B. Venugopal (National Museum of Natural History) described how the museum's projects of communication, education and public awareness are furthered by in-museum galleries, publications, travelling exhibitions and the opening of archives to students and outlined the institution's involvement with contemporary surveys and campaigns related to climate change and bio-diversity in India. Outreach programmes look to introduce new and geographically-, as well as culturally-remote populations to the work and holdings of the museum, these include nomadic peoples, people living in distant parts of the country and in city slums. The NMNH has a large library with unique collections relevant to the study of natural history, environmental science and museology.

The Museum is involved with numerous global campaigns relating to climate change and biodiversity which it will look to expand during 2014 to celebrate the bi-centenary of its founding by the East India company on the recommendation of Nathaniel Wallich, these will include an international conference of natural history museums. Dr Venugopal used the example of the *Hortus Malibaricus*, a twelve volume, Dutch publication on the flora of the Kerala region in the late C17th as an example of the rich records held by the museum and their potential to inform environmental history. He concluded by outlining the difficulties faced in gaining access to materials related to India held at European institutions.

Paramajit Singh of the Botanical Survey of India spoke of the long history of the institution, founded in 1891, beginning with the work of George Watt who was professor of botany at the University of Calcutta in 1873-1874 and who's large work, *The Dictionary of the Commercial Products of India, 1889-1890* is noted as a particularly valuable record of the botany of the time. J.D. Hooker's *Flora of British India* is seen as the most significant work of the age giving an

incomparably complete picture of the Botany of India at the end of the C19th. In 1951, after independence E.K. Janaki-Ammal was given the task of reorganising and reinvigorating the BSI. The legacy of this work is a herbarium containing some 2 million specimens. George Watt's collection, housed in an building owned by the BSI attached to the Indian Museum holds 20,000 exhibits of economic plants and some 70,000 herbarium collections. For each of the identified economic plants Watt complied a separate ledger, or 'scrap book' containing detailed information on that particular plant, over 1,000 of these survive and are held by the BSI. A current project looks to digitise the collection of correspondence relating to this collection which provide much information on transfer of plants and knowledge around the empire as well as experiments made with economic plants, most notably varieties of cotton. Collections of 10,000 botanical paintings, the Wallich papers and materials such as fabrics and natural dyes are noted as the more unusual of the BSI collections, many of which are in the process of being digitised. Materials left by J.D. Hooker and held in part by the BSI and part by Kew are seen as representing a particular opportunity for a mutually beneficial and complementary digitisation project. The detail of Hooker's observations is described, they often include speed of flowing water and the identification of suitable sites for windmills and other such installations, as well as more traditional data such as temperature and barometric pressure.

Finally in this session Fr. George Gispert-Sauch of the Jesuit Archives at Vidyajyoti in north Delhi, discussed the holdings of that library as well as those held by other Jesuit libraries in India. The library was founded in 1879 and although theological in focus contains much of value to botanical and scientific study by Jesuit authors. Maps of India, Afghanistan, Nepal and Tibet along with accompanying notes survive, often in a variety of European languages, one notable C17th example containing maps and drawings of numerous buildings and is written in German, others are written in Latin, some of these have been translated into English. C17th and C18th histories of India written mostly in Latin, French and Portuguese survive but are of unknown value with regard to the study of the environment. Travelogues and letters are generally unscientific but maybe of some value. The memoirs of the Royal Asiatic Society of Bengal from 1895-1929 are also held. On the subject of Indian Fauna a book on butterflies published in 1857 is mentioned along with 30 out of 65 volumes of *The Fauna of British India*. 60-70 years of daily recorded weather observations made at Jesuit missions are held at the University of Delhi.

A general point on the possibilities of citizen science is raised and though caution is advised such an approach is seen as of great potential not only in engaging the public but also in gathering and analysing the huge amounts of data required to build a new Flora of India.

Session 3.

Climate Histories of the Indian Ocean

Chair: Haripriya Rangan

Rob Allan (Met Office, UK) and George Adamson (University of Sussex/KCL)

George Adamson began by noting the partial nature of instrumental climate data for India and the wider Indian Ocean world, pointing out that systematic, instrumental observations did not begin in earnest until the 1870s. In some regions such as Bombay records go back as far as the 1820s but are rarely continuous, data for this period is more generally anecdotal, narrative or qualitative and therefore require significant work if they are to be rendered useful to the more statistical, climate science focussed academics. As Dr Adamson points out, the climate of the Indian ocean is dominated by two main systems, the Monsoon and El Nino Southern Oscillation (ENSO), the importance of very long climate records to understanding the variation in each as well as the

relationship between the two. The extension of records beyond the instrumental period is also seen as of significance to those focussed more within the humanities and social sciences, the social impacts of weather events as well as linkages between significant social and political shifts and environmental events, such as the drought of 1857 are highlighted as areas of potential interest.

Rob Allan discussed the Indian Ocean within the context of the broader ACRE project and the attempt to bring together material held at the numerous and diffuse archives in within the Indian Ocean, at institutions such as the BL and Kew in Britain and other colonial centres and ship log books, which for the British East India Company have been largely digitised. A significant archive in Mauritius is mentioned, built by a member of the Mauritian Meteorological Society who systematically copied down data from the logs of any ship which moored at the island. This practice continued from its beginnings in 1815 all the way up to the 1960s. In Queensland, Australia a similar archive exists collected by Clement Wragge which has allowed for reconstruction of weather along the course of ship's voyages.

George Adamson spoke on the extraction of quantitative data from qualitative descriptions such as official diaries and letters, for example some which include predictions of crop yields, length of snow season, descriptions of roads paths etc. all of which can be used as proxies for environmental conditions. The reconstruction of extreme events in Africa and India is noted as a somewhat nascent field which has seen a number of significant projects but leaves open many, many more.

Finally Rob Allan gave information on a World Meteorological Organisation meeting to be held in Mozambique in April 2014 to discuss data recovery with regional Met offices.

During questions the Tambora project which contains digitised Arab sources is reported as up and running but relatively unused. Questions over the logs of ships of non-European origin were raised, it is noted that Chinese and Arab ships were less likely to carry meteorological instrumentation and therefore any records obtained from such sources are much more likely to be qualitative, similarly with Indian Haj ships which sailed through the Red Sea. Maps, newspaper data, rail and plantation rain diaries are also mentioned as of potential value though rain diaries are noted as being particularly difficult to locate. Stock markets are highlighted as a potential source of proxy data as 'Monsoon betting' was widespread. Rob Allan asks about the possibility of retrieving daily and sub-daily data which were used to create more easily available monthly statistics such as those for Madras.

Session 4.

Regional Sources – Northern India and Bangladesh

Chair: Haripriya Rangan

Bipasha Raha (Visva Bharati University) – West Bengal and Iftekar Iqbal (University of Dacca) – Bangladesh.

Bipasha Raha spoke on the use of Indian indigenous writings as sources for information on the extent and nature of plant life, focussing on the period 1870-1880. Texts on agricultural techniques which discuss seasonality, changes in the flow of the Ganges, flowering times of different plants and floristic composition of different regions as well as some which discuss plant science, nutritional requirements etc. provide an valuable record of historical conditions. Other works cover rural history of the Bengal region and go well beyond descriptions of plant-life, giving details of social and cultural life within small villages. Descriptions of mango groves, tamarind trees and of water tanks filled with hundreds of species of aquatic plants as well as lists of anomalous, unusual

and regionally famous trees are given, as are descriptions of certain sacred trees. Some of these works were intended as text books and contain numerous illustrations, they indicate the existence of a well-educated indigenous class, working sometimes in Bengali sometimes in other vernacular languages.

Iftekar Iqbal spoke with caution on regional environmental history noting how weather systems intimately connect geographically disparate regions suggesting that the larger scale approach of the network in attempting to take as its focus, the Indian Ocean, was perhaps more appropriate. Dr Iqbal noted that Bangladesh has been somewhat neglected in the environmental history of South Asia. Political records pertaining to the management of floods and droughts are noted as significant. Written records are available for the medieval and early modern periods giving rain measurements, often these records are in Arabic or Persian. Indigenous myths and stories recorded in great detail from the C13th to the C18th provide details of common issues faced by people in the region, often environmental in nature, and are seen as neglected by historians. By the C16th British texts become available. The most significant and so far under exploited European sources are the Portuguese and later Dutch, French and British factory records. Masses of climate data which remain in British record rooms in Bangladesh are currently the subject of a British Library funded pilot digitisation scheme. The Bangladesh national archives are noted as having retained much of the local material which bigger imperial centres such as Delhi had shipped back to London. These contain protestations and requests from local people as well as records of the transport of 'coolies' from the region with notes on illnesses and deaths which provide information on regional diseases and in some cases allow historians to move beyond colonial records. Both Hunter's *Statistical Account of Bengal* and *Fisheries and Botany of Bengal* are seen as yet to be fully exploited. Bangladesh National Herbarium, which contains some 34,000 dried specimens along with a spirit collection and collection of photographs is equally seen as of great potential significance. Finally a call is made for oral history projects which are seen as of particular value in constructing environmental history in the C20th.

Both speakers noted the importance of British Library archives for their particular regions of expertise, pointing out that these records are available nowhere else and have thus far been remarkably underused. In questions, debates over the introduction of modern agricultural methods and how these relate to the texts described by Dr Raha are raised, it is noted that while often missed in later works Bengali periodicals since 1870s contain much of interest on this debate. Minoti Chakravarty-Kaul raised the possibility of using of secondary sources written pre-independence in assessing processes of village formation which took place in this period.

Session 5:

Regional Sources – India, Sri Lanka and Southeast Asia

Chair: Minoti Chakravarty Kaul

Najaf Haider (JNU) – Persian Records. MCM Iqbal (Institute of Fundamental Studies, Kandy) – Sri Lanka, Aparna Vaidik (Georgetown University, Washington) – Andaman Islands, Fiona Williamson (National University of Malaysia - UKM) – Malaysia.

Najaf Haider spoke on Persian language sources which dominate elite records through the medieval period. Moghul records expanded greatly in the C14th with the advent of paper manufacture in India and include histories – both official and private – official and private biographies, memoirs, treatises, anthologies, administrative manuals and documents, official and semi-official records, land sale records, gift transfers and letters. Here the National Archive is the single most significant holding. The Moghul's 'core holdings' are completely destroyed but some copies taken by regional

and private interests survive, including records of droughts and floods. An incident of particular social and political interest, the famine of 1631 – described as the most destructive event in the history of Moghul India – killed millions in the Gujarat and the Deccan, prompted large-scale migration, during which, faced with starvation, some are reported to have turned to cannibalism and the consumption of exhumed bodies. Relief measures were limited but records of those actions that were taken are well recorded.

Dr MCM Iqbal spoke on Sri Lankan sources focussing on forestry, forest ecology and climate change. European colonial records – initially Portuguese (c.1505-1638) – focus on economically significant plants such as spices but also include much work on medicinal plants. In the Dutch period (c.1638-1796), the records of Paul Hermann, chief medical officer of the Dutch East India company produced five volumes of pressed plants which were used by Linnaeus and are now held in the Natural History Museum London where they remain well preserved. In the British period (1796-1949) collections, drawings and manuscripts were gathered in earnest at the botanic gardens in Colombo and the botanic gardens at Kandy were founded. In keeping with earlier efforts economics was often the driving force, however in this period some private enthusiasts came and made surveys of the natural history of the island. Many also came from British institutions such as Kew – notably Joseph Banks – and sent thousands of samples back to Britain while at the same time building impressive collections in Sri Lanka. Drawings were also sent back to Kew and the Natural History Museum in London, often by indigenous artists who moved across the island making surveys. Military men and administrators were also often involved in the collection of specimens which were again, most usually sent back to Kew. In the 1860s the Department of Meteorology was founded in Sri Lanka, these departmental records along with reports authored by government officials contain much in the way of weather and climate data. Rainfall records begin in the late C19th, from 1925 there are records of wind speeds in Colombo, there are also long barometric records, however these archives are at significant risk, digitisation of such records is seen as necessary in the near future before they become too delicate to work with.

Aparna Vaidik discussed the particular character of the history of islands describing how the centrality of human mobility and trade networks to the historiography of ocean regions has led to a situation in which islands with little economic impact are apt to be ignored. A number of ‘types’ of island histories are identified, those of plantation islands, settlement islands and islands seen as ‘anthropological Edens’ such as Polynesia, New Guinea and the Andamans, where human populations are seen as stone-age relics. Environmental histories of islands have been more kind but nonetheless have tended to reduce islands and island populations to bit-parts in imperial narratives and failed to rescue them from their peripheral status. Histories of Islands in general are seen as subscribing to what is referred to as ‘methodological capitalism’ in which the development of capitalism constitutes the ‘grand meta-narrative’ within which history is written. Such histories represent islands as bounded, isolated from the commercial centre and often self-sufficient, harnessing a somewhat pejorative connotation to what is otherwise a merely geographical label, a connotation which extends then to islanders, island animals and environments. Histories of islands are therefore not only *about* such systems but also exist within historiographical meta-systems which serve imperial and/or capitalist ideologies.

The Andamans are seen as of particular interest due to their status as a twice-failed colony – a failed plantation colony, and a failed prison colony – and further that the islands’ failure to ‘do what the British wanted’ is rooted in its environment. Such a space, and history written about such a space is therefore seen to contest conventional narratives and value systems and to free history from subservience to capitalism.

The Andamans are a group of >200 islands in the Bay of Bengal, an extension of the Indonesian archipelago, populated by a number of pre-neolithic tribal peoples whose population was decimated

by first contact with the Europeans. The British envisaged an easily patrol-able penal colony where islands could be watched at a distance by a small administration however, the endurance of pre-existing intra and inter-island networks permitted communication and exchange and made convicts difficult to separate from labourers or other inhabitants. The failure of the British to break these networks in the end became the failure of the prison colony. Meanwhile, over optimistic assessments of soil fertility combined with attempts at swamp clearance – which resulted in huge numbers of deaths from malaria – caused the British to abandon their plans to develop a viable plantation economy as had been achieved in Mauritius, Penang and Singapore. The Andamans were a huge drain on British resources and British presence was eventually reduced to a single meteorological station.

Colonisation then, for the Andamans, reinforced its metaphorical isolation, in history it is observed that human intervention can break geographical isolation but that in this instance human intervention added ideological and perceived cultural distance to that pre-existing geographical distance. It is therefore argued that the way forward for environmental history is not necessarily through the opening up of new sources but through increased cognisance of methodological frameworks within which research is carried out, if the extension of the availability of data merely serves to facilitate the telling of more stories from within the imperialist framework, then the opening up of sources simply serves to engrain such ideologies.

In summary Dr Vaidik identifies archaeological sources, historical linguistics, anthropological studies, travel narratives, navigation journals and settlement reports all of which give great detail in descriptions of climate which was naturally of great interest to travellers. Surveys such as that carried out by Archibald Blair give details of geography and forestry. While transportation records often provide details relating to disease. Many of these are to be found in the National Library in Calcutta, further photographs, videos, maps, travel narratives and field reports are held in the Anthropology institute in the British Museum. Headstones in the European cemetery in the Andamans also provide interesting details on disease and the movement of people through imperial networks.

Fiona Williamson spoke on regional sources for Malaysia relating to the historic climate and environment in the British colonial period (1786-1948). Sources relating to the ‘Straits settlements’ are noted as being particularly rich, though they are not the only sources, they are written in English and are therefore accessible to a particularly wide range of scholars. Some are held at the British Library, some at the national archive and many at the national archives of Malaya which also house many correspondences which were never transported back to London. The Malayan archives are essentially untouched by environmental historians. By way of survey Dr Williamson identified the following themes connecting much of the material; plantations, forests, botanic gardens and climate. Malaysia’s climate is dominated by the monsoon and due to its closeness to the equator features only two seasons, both very wet. In Malaysia poor soils, mountainous geography and thick rainforests hindered agricultural development in the early period. The C19th witnessed massive environmental changes as private plantation development took hold. The original surveys undertaken in preparation for the development of such plantations hold much information on climate and environment and are held in the national archives, plantation records themselves however are often in private hands. Particularly interesting material survives on the relations between imported labour and plantation owners, Indian and Chinese labourers were brought in in great numbers during the late C19th and early C20th and remain a significant part Malaysia’s ethnic composition.

On the subject of forests it is noted that the colonial administration were quick to recognise the economic value of the forests and therefore to bring them under their control. Records relating to the forestry board but also to conservation produce interesting links back to London and often Kew.

In the C20th responsibility for forests and associated research and management become split between the colonial administration and the forest Institute of Malaysia. The national archives hold records from these on timber trade, exploitation management and reserves while institutions hold their own archives. Conflicts over rights between land-owners and the local population, often over charcoal burning and timber felling appear to have been common and are well documented through reports and petitions. The records reveal the particular symbolic importance of the jungle in Malaysia, in WWII it is noted that the jungle became the centre of native resistance to the Japanese and again in the 1950s to the British.

Just as it had in colonial forestry, Kew played an important part in determining the way botanic gardens were set up in Malaysia and Singapore. The system of botanic gardens are seen as a particularly valuable lens through which to view colonial structures, revealing how people, plants and ideas moved around diffuse imperial networks.

Lastly, Dr. Williamson argued in favour of large scale statistical projects such as ACRE, describing their usefulness in contextualising non-statistical based history, highlighting the trend in recent years to look again at C17th European history, particularly military history taking note of weather conditions.

During questions on this session the value of comparative studies on famines was raised, as was the possibility of using artistic representations as records of climate variation and responses to disasters. The various uses of language within famine reports, the metaphorical nature of language and the resulting difficulties in extracting factuality from reports such as those of the 1631 famine are highlighted, it is noted that depiction of cannibalism became a rhetorical trope by which the severity of famines was communicated, judged and perhaps distorted in an act of deliberate ‘Othering’ by Moghul administrators. Others including Najaf Haider noted how the particular space of the famine acts as a site of lenience in which expressions relating to cannibalism are non-accusatory and act – again in metaphor – as an expression of sympathy with those who suffer and the extremity of the context in which they act.

Day Two

Session 1

The Environmental History of the Permanent Settlement, 1793.

Rohan D'Souza (JNU), Chair: Vinita Damodaran

Dr. D'Souza described the permanent settlement and the institution of private property, ownership and taxes not as it has sometimes been represented, as a result of trial and error and a response to conditions on the ground in India, but as a manifestation of the colonial doctrine. This doctrine as it related to land had a particular interest in marginal lands such as swamps and marshes and held that land and water should not exist intermingled as they do in such landscapes but should be separated. Such landscapes are significant in Bengal and Bangladesh and have been in Europe, most obviously in the Netherlands, their removal and separation into domains of land and water is seen as key to the extension of notions of permanence and ownership and therefore to the colonial project itself in which land becomes a discrete legal entity and the domain of law while water becomes a resource or technical problem. In Europe the canalisation of rivers and their consequent subservience to the needs of commercial transport can be contrasted with the relative mixed and complex nature of Indian delta economies where land and water were mixed and engaged in an ongoing process of destruction and rebuilding inimical to notions of ownership and permanence. Many records of the

colonial mind-set exist which can help to plot how the colonial powers sought to transform India from an 'amphibious' society into a 'reptile' society and the repercussions thereof for governance and the socio-economic state of the colony. Dr D'Souza describes how this rethinking of the colonial project reveals new meaning in what were previously seen as merely technical works, now rendered deeply revealing of the colonial mind-set. A more flexible administrative system is seen as having been imposed under the Mogul Empire in which administrators sought to control people via the control of surplus rather than via permanent taxes and through law which necessitated grand scale manipulation of the physical environment and the destruction of the pre-existing culture. The British system was unable to respond to climatic variation, permanent taxes were levelled which were inflexible and unable to respond to droughts and inundations which had enormous repercussions for crop yields and the ability of people to pay such taxes.

During questions themes of gender related to the feminine labelling of rivers, the exclusively male engineering class and discourses of control are raised while language of warfare and embattlement are recognised not only here but across a much wider range of texts and records with an environmental perspective such as epidemiology as they exist in the colonial context. It is also noted how a shift toward environmental history – specifically history of rivers – remains intensely subversive, attacking notions of states and fixed borders and doing away with histories written within such ideologically constructed physical borders. The subversive nature of rivers is noted particularly on the Indian - Bangladeshi border where the dynamic nature of the land/water inter-relation renders the task of defining a fixed physical border an impossibility, as well as across India where power is seen as reaching out from east to west while drainage flows north to south creating a tension between traditional economies, ecologies and livelihoods and the imposition of state-level power.

Session 2

Manuscripts and Non-Conventional Sources (pre-colonial and colonial)

Chair: Penny Brook

Sangeeta Dasgupta (JNU) – Adivasi sources; Minoti Chakravarty-Kaul (Delhi University) – Village Records; Dr K. Anupama of the French Institute at Pondicherry – pollen data analysis

Sangeeta Dasgupta (JNU) spoke on the subject of Adivasi sources, looking at pamphlets and petitions associated with indigenous political campaigns beginning in 1914. Pamphlets contain stories told at ritual gatherings which were then transcribed and distributed during demonstrations and submitted to politicians. Such stories are often historically framed and represent a significant resource for the writing of environmental history. Since its emergence in the 1980s environmental history in India has developed significantly in terms of nuance, doing away with stark definitions between pre-colonial and colonial and moving beyond an initial preoccupation with forests, considering much more in the way of subjective concerns. In this regard such political pamphlets represent a valuable resource in the reconstruction of the traditional Adivasi connection with forests, animals and landscapes and in plotting its development across the C20th and up to the present. In their subjectivity pamphlets present an important counterpoint to official documents while in their detail they contest the basis and extension of land registration in India which allowed prominent families to make unfounded claims on indigenous lands. They reveal Adivasi ideologies as they relate to the forests and therefore help to move our appreciation of the impact of land alienation beyond the loss of grazing, firewood and building materials, toward a deeper understanding of the psychological impacts of such colonial activities and how the construction of histories was central to Adivasi claims on land. Finally it was noted that Adivasi ideologies, histories and cultures are by no means homogeneous and that these pamphlets provide unusual insight into difference and

change across various communities throughout the C20th.

During questions it was noted that no central or regional archives of such pamphlets exist, their recovery is only made possible through personal connections with campaigners who are working to address Adivasi land claims and have therefore made their own collections.

Minoti Chakravarty-Kaul (Delhi University) spoke on the subject of village records beginning by highlighting their vulnerability, firstly in a physical sense – it is noted that the documents themselves are deteriorating – but also in a legal sense due to the extension of land reforms. Village records contain details of land ownership rights, rights relating to payment of taxes as well as customary rights. Many records are continual for very extensive periods, some reaching back as much as 800 years. Such records contain details of common land holdings in villages and how these worked to allow communities to respond to variable or uncertain conditions. Further it is noted that in areas of most extreme annual weather variation transhumance systems had developed involving seasonal migration and, while these semi-nomadic groups did not keep their own records, the customs they shared with stationary groups were recorded in these villages. It is noted that in cases of drought in lowland areas pastoralist groups would take cattle from villages along with their own up into the foothills and the mountains for grazing. In every region records exist of specifically timed movements of nomadic peoples into sedentary villages where temporarily available resources are used and shared customs exist. In famines and droughts such customs became more important and allowed peoples to survive in very extreme conditions.

Moving up into the Himalayas the photographs of Jean Phillippe Vogel taken in the very early C20th provide a very rich resource and means of assessing environmental change in the region, here it is noted that Gompas (Tibetan Buddhist hill forts and places of learning) also hold very significant records but that they are very remote and often remain very difficult to get to.

During questions it was noted that records going back to the early C19th hold details of contested rights which are seen as a hallmark of the kind of small scale democracy existing in such villages. The existence of very large scale genealogies recorded on cloth using vegetable dyes and remaining in good condition is also mentioned, these take the form of oral histories dictated and taken down by scribes in the villages. Droughts and famines are common features of such genealogies which therefore represent a major resource for the extension of the writing of environmental histories into remote regions and distinct cultures. Dr Chakravarty-Kaul pointed to her own work on the foundation of New Delhi as an excellent example of what happens when such systems are disturbed and consequently of the inappropriate nature of governmental and state-level control of environmental resources and issues. The power of the two and three field systems to alleviate risks arising from climatic variability is emphasised as is the fact that the appropriateness of such a system can be shown in by the application of modern economic theories and models.

Dr K. Anupama of the French Institute at Pondicherry briefly outlined how pollen trapped in deposits in lake beds and peat bogs, can be sampled in the form of cores and when analysed gives a vegetation history of the area which, as well as being of great interest in itself, can act as a proxy measurement for climate variation. In areas where instrumental records exist these can be correlated so as to gain more accurate proxy measurements from pollen counts. Irrigation tanks have proved a very interesting site for such experiments and have allowed for the reconstruction of variation in type and extent of vegetation, a forthcoming publication analyses one such tank system for the period of 1790-1950. In this period pollen samples clearly show the impact of forest clearance for settlement and much later of the reafforestation act. Variation in monsoon levels have also been noted within the pollen record. Some irrigation tanks are very old and some have been analysed which contain sediments going back some 1600 years. In these, settlement and very notably the beginnings of rice cultivation are particularly marked. The importance of combining documentary,

instrumental and other types of records with historical pollen analyses is reinforced.

Session 3

Navigation, Exchange and Connections

Chair: Antonia Moon,

Ajay Mahajan (Kalpavriksha), Anna Winterbottom (McGill University/Sussex University); Haripriya Rangan (Monash University)

Ajay Mahajan of the NGO Kalpavriksha discussed working with communities in the Western Himalayas aiming at instituting regimes of sustainable farming, water management and conservation in an area which has witnessed many significant environmental movements, most famously the Chipko movement. The subject of oral histories relating to botanical and meteorological knowledge is raised, in particular the masses of indigenous knowledge of local flora, medical and food plants, climate coping strategies and sustainable resource management are noted. Massive biodiversity exists in such community managed environments, in the region of 100 tree species with a village agriculture and common land area is given as typical, local communities are seen to have developed their own sustainable forest policies which have on occasion been recognised by the government for their value. The resilience of such systems is emphasised, many having survived through the imposition of colonial forestry regimes, independence and even up to the present. The penetration of mining interests in the region have likewise been confronted and withstood, however the most significant threat is now represented by the building of large and smaller scale dams. Significant progress has been made, particularly since the 1970s in regenerating forests which had previously been damaged by large scale commercial interests, here particular mention is made of the success in encouraging unusual levels of biodiversity in these community run forests, often greater than that found in national parks despite the fact that these forests also support village agriculture. This particular form of argo-forestry is noted for its exceptional value as a carbon capture system, it is noted that deep, healthy forest soils often hold more carbon than the forest canopy itself.

Traditional knowledge systems are seen as under significant threat as younger generations look to move away from ancestral lands and occupations, it is therefore seen as of key importance to record the deep ecological knowledge of the region held by older generations before it is lost forever.

Lastly the question of sustainable pilgrimages is raised. Travel into the Himalayas has become unsustainable and destructive, in this regard it is seen as of particular interest to see how pilgrimage has developed over the centuries in order to work towards maintaining pilgrimage in its role of opening up people's minds to unusual and distinct cultures might be possible while ensuring that the safeguarding of these cultures and their environments supersedes these interests.

Anna Winterbottom spoke on the extraction of Environmental information from medical records and material culture in Sri Lanka in the Kandyan period, based on Casey Wood's collection of medical manuscripts and objects in a collection at McGill University, part of a wider project looking at medicine in the Indian Ocean world. The project focuses on the movement of medicinal plants and knowledge across the region in the period 1500-1800. Throughout the period a high degree of transference both via import and within the region is noted. Throughout the region there were many beliefs pertaining to both cause and to cure which became something like universal such as spirit possessions, acupuncture and scarification. Sri Lanka has long been noted as a centre of medical innovation, this tradition has left a long, detailed record of plant transfer and movement of disease. As has been noted elsewhere there existed in the Sri Lankan tradition a strong belief in the link

between health, disease and environmental conditions. One example is noted in which 27 different types of fever are identified and associated with lunar phases, therefore both astronomical and astrological texts, of which there are many at McGill also represent interesting records of medical and environmental thinking.

Material culture can often reveal changes in social relations, power structures and aspects of people's relation to the natural world, within the region, for example in the period before the advent of British rule in 1815, very ornate pill boxes were carved from ivory which was controlled by the Kandyan king, under British rule and therefore British control of resources, these are no longer seen. Similarly, changes in the traditional use of lac (as used in lacquering), a product used in many crafts and produced from the excreta of a particular insect, can be seen as revealing of degradation in population of a very specific, small variety of trees inhabited by that insect. Depictions of plant life, on everyday objects as well as in temples are likewise useful resources, revealing particularly of the cultural or mythological status of certain plants. The example of the bay is given here as a plant thought sacred to the Buddha and often used alongside other plants in temple decoration.

Dr Winterbottom concluded by outlining a variety of archival resources and noting that many manuscripts are somewhat vulnerable to decay, a problem sometimes exacerbated by western ignorance of traditional preservation methods, it is noted for example that palm leaf manuscripts are traditionally maintained and preserved by coating in dimela oil. Finally it was noted that many medical manuscripts are retained by practitioners and as such may represent a resource particularly suited to digitisation.

In questions the transfer of plants and trees, for example snake wood, sandal wood and the bow tree, from Sri Lanka to Malaysia within the time frame of British rule but outside of colonial networks was noted, I.H Burkill's work *A Dictionary of the Economic Products of the Malay Peninsula* (1935) was mentioned as a particularly rich record of plant transfer between Malaysia and Sri Lanka.

Lastly in this session Haripriya Rangan spoke on how identities and notions of regionality and belonging are often articulated through association with particular plants. Discourses of conservation are very often centred on the invasion of habitats and landscapes by non-native species, much of Dr Rangan's work has focussed on testing these ideas of invasion by studying plant movement. The transfer of acacia varieties between India, East Africa and Australia – despite all these regions having their own native varieties – is seen as a particularly interesting case-study. Such study has revealed that notions of nativeness and non-nativeness are not universally invoked in times of perceived threat and rather that a kind 'ecological-nationalism' develops focusing on certain, talismanic species. The tradition of environmental history is criticised for the respect shown to national boundaries and for its focus on plant transfer within colonial networks, it is noted that plants had often been and continued to be moved around by non-imperial agents and that recognition of the inherent dynamism of Indian ocean ecology be recognised. The example of a South American acacia variety which had been moved to Australia before the arrival of the British is given as illustrative of the limits of an environmental history written through colonial records and disruptive of the widely respected demarcation of native and non-native Australian plants based on the arrival of the British in 1788.

Work on the Baobab – found in Africa, Madagascar, Australia and India – looks to push study of such transfer back to a much earlier period. The Baobab, like many crops and other plants were moved from Africa to India well before European influence in the region developed. Small African communities found throughout India, South Asia and the Middle East, have become thoroughly enough assimilated to have lost most, if not all, of their traditional ethno-botanical knowledge, yet the movement of the Baobab, long central to a huge variety of African cultures, is seen as a possible route to the rediscovery of some of these systems. Genetic studies looking at divergence in African

and Indian Baobab populations was used to determine the likely time at which transfer took place. It was found to long pre-date the assumed date of transfer which had been located within the development of Arab trade routes throughout east Africa, India and the Middle East. It is noted more broadly that genetic analysis should therefore be considered as a useful tool in questioning and overturning long held assumptions about plant transfer and in removing the ties between environmental and colonial history, working to re-cast 'the African' as an independent agent rather than just a victim of colonialism.

In questions the recent discovery of C14th African gold coins on an island off northern Australia is noted, it is observed that while the question being asked has often been 'how did they get there?' we should rather be looking to ask why has it taken so long to find evidence for such links which we must suspect, between African and Australian indigenous cultures. That is to say, how can more completely free our study of history in the region from the colonial networks which still dominate our resource base and in-so-doing impose certain ideologies on the products of that study.

Session 4

Possibilities of Digital Archives

Chaired by Rob Alan (ACRE/ UK Met Office – Hadley Centre)

Richard Gartner (KCL)

Richard Gartner discussed possibility of creating a large scale digital library bringing together the types of sources and facilitating the kind of work discussed throughout the two days of the conference. Some of the main challenges of such a project were outlined, these included ensuring that sources were easily locatable within the system. Here it was noted that any such catalogue must at some point answer the question of 'granularity', that is the level of detail to be included in the catalogue, be that archive, manuscript, page etc. The second major task is seen as that of rendering and storing such sources in such a way as to make them interoperable, that is to build a standard format by which operations such as searches can be executed across all archives at once. The Bodleian library's digital collections were given as an example of the repercussions of a failure to ensure interoperability, each of the archives is accessed by its own website and uses different types of categories and searches, as such, and considered as a whole, they are remarkably un-user-friendly. Thirdly, and perhaps most interesting of the three is the task of making the whole set of resources 'tractable', that is to extract and store very detailed sets of data from these archives in such a way as to enable the development of new, resource and discipline specific analytical tools and methodologies, thus opening up new areas of research and new applications for the material in question.

Examples in which data is re-visualised via mapping onto existing infrastructures such as Google Earth or Google Maps and the creation of time-lines are given as ways in which new patterns and links between data can be revealed. Further, the possibilities of a ‘semantic web’ are outlined in which appropriately marked-up data can be combined across the entirety of the internet thus enabling the creation of databases on an enormous scale.

The example of the CENDARI project is given as precedence for large scale link up of resources within digital infrastructures and provide much of the necessary groundwork required for such a project. Further it is noted that numerous functionalities are provided for by readily available, pre-written schema, all working with the standard digital archiving language of XML. Much of the technical work has been done and is available open source. The major financial costs are envisaged to arise at the level of data capture and physical mark-up of resources at the level of single entries.

The final speaker .Dr Murali Krishna, Coordinator Centre for Atmospheric Sciences & Weather Modification Technologies, Hyderabad, (ICORG) focussed on the intricacies of knowledge production pertaining to the kind of project discussed over the course of the conference, highlighting the importance of considering how the nature of available records, which we choose to value most highly, to digitise, to save, to facilitate access to will determine the kinds of research and consequently the kind of conclusions drawn from such data. Consequently he identified as of primary importance the development of a kind of universal syntax or language as discussed by the previous speaker not only at a digital level but also at the level of academic discourses relating to such sources to ensure the full potential of the interdisciplinary approach could be revealed.

Future Projects

In the final session of the conference – introduced by Deepak Kumar and Vinita Damodaran – groups discussed possible research areas, projects and collaborations. Deepak Kumar noted that while the mapping of sources was perhaps at this stage the main focus of the network, that the production of scholarly work, the building of an academic legacy, should be seen as of equal importance. That an edited volume would be produced by the network and published by Palgrave was announced while individuals were encouraged to continue to work and publish on this area. In particular Prof. Kumar called on academics to encourage PhD projects related to the network's area of focus seeing these as the best route to ensuring this academic legacy. Vinita Damodaran stressed the importance collaboration, the potential of an interdisciplinary approach and the value of the network in creating and fostering such connections. Those at the conference were encouraged to fill in and return archive questionnaires sent out by the network which are seen as key to the identification of appropriate digitisation projects in the next phase of the network's major infrastructure project.

The Indian Ocean Centre at McGill and the Indian Ocean and South Asia Research Network based at Sydney's University of Technology are mentioned as potential collaborators with distinct but related foci. The lack of journals dedicated to the environmental history of India, Africa and the Indian Ocean region is noted as a barrier to the development of research in the area while consideration is urged of the project's intended repercussion in terms of the modification of the meaning and central narrative of environmental history.

Before the close of the conference discussion groups were set up centred around four major topics, the chairs reported on the outcomes.

Plant Transfers – the subject of invasive species in relation to colonialism and climate change were seen as of particular interest. As such it is noted that the botanic garden remains the institutional centre of the research. The disappearance of indigenous plants, the ICU 'red list' were mentioned. The sharing of data and technology in the Wallich and Hooker projects was criticised as having been insufficient as far as Indian institutions were concerned and that far more in the way of repatriation of sources had to be the focus of subsequent projects. Plant use – particularly within ritual and food was identified as a neglected area for which very rich sources were available. Agricultural magazines were seen as a potentially excellent first digitization project.

Climate History – issues of geographical bias in sources – and therefore in probable outcomes – were seen as of particular concern. A significant historiographical gap was identified in the study of the Indian Ocean arm of El Niño – sometimes known as the Indian Ocean Dipole – which might represent a suitable guise under which to perform a hunt for island sources in the Seychelles and the Maldives in particular. The IOR-ARC (Indian Ocean Rim Association for Regional Co-operation) group were mentioned as a possible source of funding for such a project while the vulnerability of

such island environments to climate variation and climate change make such a project particularly significant and timely.

Environmental History of India – here the consensus emerged that the network should be aiming to produce some major output in something like 2-3 years' time, perhaps a number of source-books one on river sources, plant sources, sanitation, village records etc. Such source-books could be published in physical form or online. The existence of a British Library guide to sources for *Science and the Changing Environment in India 1780-1920* was noted. As an example of the huge quantity of resources it is observed that this guide (which covers only BL archives) took well over two years to compile but should yet not be considered comprehensive.

Maritime Networks and Exchange – the potential of maritime histories to break down preconceived notions of space, regionality and of the state were noted along with the way in which a shift of focus in such a direction can create new chronologies, new conceptions of narrative in regional and world history. The movement of people, plants and ideas was seen as intimately tied with maritime networks, thus the introduction of steam is refigured as much more than technological advance. Studies of ship's impact on land, that is most notably through the development of harbours, ports and associated towns as well as the impact on religion, pilgrimage ships, e.g. to the Haj, were also seen as of great interest. In terms of sources, almanacs, farming diaries, plantation account books, ship's logs and court records – relating to piracy – were seen as of particular interest. This group agreed with the general idea of a large scale database of source material while adding that a museum outreach programme should accompany such a project to facilitate the spread of such work and ideas beyond the academy.