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ENVIRONMENTAL HEALTH AND WILDLIFE RESEARCHWITH TRANSNATIONAL EDUCATION FOREBODINGS, APPLICABILITY AND APPROACH

Recommendations of the Conference "Wildlife and Aerobiology"

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Pakistan, the sixth most populous country (91.71 million)in the world, is battling to keep the balance between economic growth and environmental protection. At present the government is mainly focusing on meeting the energy and food needs of the country and environmental protection is lacking serious attention. Pollution (air, water, and soil), sanitation and loss of wildlife and biodiversity are growing environmental health issues in Pakistan. In order to deliver demand led solutions to these multifaceted challenges development of institutional and technical capacities in the countryis prerequisite. Transnational Education (TNE) provides institutional mobility in tertiary education and through British Council facilitated links we were successful in developing a much needed baseline courses work and underway the research for environmental health related issues. The Government of Pakistan will certainly use the data from the research and experts will also be available to concerned departments to tackle emerging environmental problems. Additionally the understanding and concerns of TNE in academic, economic, career and socio-cultural contexts could be imperative challenges. Through TNE it was learned that other nations / regions can be benefitted from such institutes and concerned people for a true flow of knowledge for reciprocated problems. The recommendations include general considerations for policy makers which are linked with environmental health and wildlife. Among the general considerations, or overarching advice, is that policies should promote community-wide action to manage wildlife, biodiversity, environmental health and that the safety of new emissions and exposure with technologies must be assessed rather than estimated.

Wildlife and Biodiversity Issues

1. Transnational Education provides a progressive base for teaching and research in the new subjects such as environmental health, wildlife and biodiversity at tertiary education level. Since the understanding developed between institutions of the world that environment and wildlife issues have global perspectives so the courses focusing on wildlife interactions, distributions, populations and habitat use, are much needed to prepare a cadre of research biologists to ensure sound management for wildlife and biodiversity.
2. Without a clear understanding of the biology of our wildlife species, we cannot plan or predict the effects of management strategies. New research projects should include a field component designed to collect data on specific wildlife species and to test specific hypothesis about factors regulating wildlife populations.
3. Research results should be used to inform management strategies/policy for wildlife and biodiversity within the district, as well as at provincial and federal government agencies.
4. All the districts should be responsible for collating existing research relating to wildlife species, and the interactions between these species and their habitats.
5. Sensitive habitats should be identified and designed to maintain ecosystem health. Therefore it is recommended to execute GIS support to use spatial data to identify vulnerable areas for wildlife and biodiversity.
6. Field studies should be completed to provide population estimates or relative abundance estimates, and this information coupled with trend data gathered from hunter/trapper returns.
7. This information should be used to develop annual and long-term management plans for the province's wildlife species, covering issues related to quota allocation, animal-human conflict issues, hunting and trapping seasons, and zone boundaries.
8. Captive animals in zoos should be kept in healthy environments with the applications of international zoo norms with housing, upkeep,

health care, adequate space for free movements with successful breeding programmes.

Environmental Health Issues

Exposure to ambient air pollution, particularly, in urban centres and indoor air pollution due to use of solid fuels as household fuel and lack of access to safe water and sanitation facilities are major public health concern in the country. The measurement of air pollution is essential to ensure air quality standards are being met. Great progress has been made in recent years in developing techniques to monitor pollutants. Recent monitoring campaigns have revealed that the levels of different air pollutants, particularly, particulate matter are significantly higher than the Pakistan's National Environmental Quality Standards (NEQS) for ambient air, WHO guidelines and International (USA, EU) ambient air quality standards.

Monitoring is an essential component in the effort to control and understand the effects of pollution, even though the measurement of levels of pollution does nothing in itself to make to air any safer. The following recommendations could lead towards better environmental health conditions.

1. Emissions of air pollutants should be categorized based on the spatial characteristics of the source including point, fugitive, and mobile sources and, further, by process, such as combustion, materials storage, or other sector specific processes.
2. The generation and release of emissions of any type should be managed through a combination of:
   - Energy use efficiency
   - Process modification
   - Selection of fuels or other materials, the processing of which may result in less polluting emissions
   - Application of emissions control techniques
   - Air monitoring programme
3. Industries with significant sources of air emissions, and potential for significant impacts to ambient air quality, should prevent or minimize impacts by ensuring that:
   - Emissions do not result in pollutant concentrations that reach or exceed relevant ambient quality guidelines and standards.
   - Emissions do not contribute a significant portion to the attainment of relevant ambient air quality guidelines or standards.
4. $PM_{2.5}$ in diesel exhaust can exacerbate respiratory illness, and chronic exposure to diesel exhaust may increase the risk of lung cancer. The impact of diesel emissions on the lung cancer risk should be identified.
5. There is a need for sensitive and specific early-warning indicators that air has been contaminated. Such indicators would allow researchers to predict whether there enough pollution is there to affect air quality and hence human health.
6. Knowledge of the fate and transport of pollutants is required
   i. To determine whether pollutants can migrate to public,
   ii. To identify early-warning indicators, and
   iii. To estimate the transit time of target pollutants and identify suitable remediation strategies.

   Interaction between the pollutant and particle phase determines the speed of pollutant transport and whether the pollutants can reach unbearable limits.
7. The toxicological properties of the chemicals alone or in complex mixtures have to be identified indifferent sets of environmental conditions.
8. Airborne emissions may affect indoor residential air quality when they penetrate the indoor environments. The penetration level should be identified in all residential settings.
9. Prospective longitudinal epidemiologic studies should also include environmental sampling and/or bio-monitoring of exposures to demonstrate a dose- or exposure-dependent association with the end point(s) being measured. Studies should include occupational exposure and vulnerable populations (e.g., pregnant women, children, the elderly, and individuals with asthma).
10. Investment in water and sanitation infrastructure is urgently needed to improve population health.
11. Focus on socio environmental determinants of different environmental hazards is required to inform and develop mitigation strategies.
12. Community-based participatory research will provide a framework for engaging community members in research and could be effectively applied to a number of environmental health problems.
13. The World Health Organisation reports that almost 3 billion people, in low- and middle-income countries mostly, still rely on solid fuels (wood, animal dung, charcoal, crop wastes and coal) burned in inefficient stoves for cooking and heating.Regional and WHO indoor air quality guidelines for household fuel combustioncan help public health policy-makers, as well as specialists working on energy, environmental and other issues to devise best approaches to reduce household air pollution - the greatest environmental health risk in the world today.
14. An urgent attention is needed for solid waste management in urban areas and burning of waste should be strictly prohibited
15. All the small industries should be moved out of residential areas to designated small industries estates out of city centres.