PLENARY SPEECH

ACHIEVING WATER RESOURCES SECURITY VIA ENVIRONMENTAL HUMANITIES: EXAMPLES FROM MALAYSIA

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ABSTRACT

The literature on water management shows that many countries focus on adopting water conservation measures via changing water fittings, or the hardware. However, social scientists, believe that merely adopting a technical solution will not solve the entire problem because they do not address the root causes, viz. human mismanagement and wastage, or the software. It is argued if human behaviour is changed from a wasteful and apathetic behaviour to a responsible and caring behaviour, water conservation will be successful. When the behaviour of an entire society or country towards water consumption is changed towards the better, a water saving society will be born. In many countries where the citizenry are sensitised towards water and environment, water consumption is minimised and rivers are kept clean. This paper seeks to highlight the alternative, affordable and highly effective measures of changing human behaviour in relation to water and water use. A change in human behaviour is needed to ensure sustainability of water resources and water security in Malaysia.

INTRODUCTION

Much of the environmental problems facing humanity in the 21st Century are human-created [1] but human society has chosen mostly to tackle them via the structural approach, employing science and technical solutions while ignoring the root causes [2]. This approach is ineffective. Since environmental problems have their root causes in human society, clearly the most appropriate and effective way to address them is not through science but through tackling the human causes. The study of Environmental Humanities (EH) can provide more effective answers to environmental problems. According to [3], the narrative and theoretical threads of the EH are more entwined than ever with the scientific, ethical, and political challenges of the current global ecological crisis, and it is imperative to rethink how the Anthropocene, the posthuman and the environment are connected (affect one another) from not just one perspective but from multiple cross-disciplinary perspectives. The EH of [3] refines the environmental debate with new conceptual tools and revitalizes thematic and methodological collaborations in the trajectory of ecocriticism and the environmental humanities. Addressing environmental problems (which have become increasingly complex and multi-dimensional) is no longer possible with singular approach. Effective environmental management in the modern era needs to draw on cutting-edge studies in all the major fields of the environmental-cultural debate in order to find innovative solutions together with contribution from within the field of EH.

RELEVANCE OF ENVIRONMENTAL HUMANITIES IN UNIVERSITIES

The study of humanities is all about humans (and human society) and how they interact with their environment, both natural as well as cultural. The humanities encompass studies in literature, philosophy, social science, geography, languages, history (including art history), religion, music, paintings, sculptures, books, and other works of art. The humanities focus on the development of major religions and philosophies and examine how they develop and evolve through history. In the modern era, the humanities have transformed into high-tech areas as many researches in humanities now integrate the study and use of technology. Some examples include using computers, cell phones, PDAs, GPS, Digital Mapping (Digital Humanities) in humanities research. Even in art, there is now digital art. Consequently, the development of EHs is inevitable. EH essentially deals with a wide range of contemporary environmental problems resulting from the interactions between humans and nature. One of EH's primary objective is to aid understanding that environmental problems are multi-causal phenomena, and to develop skills in humans necessary for effective environmental citizenship and leadership. [4] found that there are solid links between the humanities and technology.

EH relates to investigating environmental/sustainability issues from the perspective of the humanities. EH is a humanities perspective on environmental areas of scholarship and research. EH may be seen as a response to both transdisciplinary and disciplinary demands both from within and outside the confines of the university. Recognising the importance of EH, many universities all over the world, including those ranked in the top ten, have established research clusters, programmes and departments on EH. At Oxford University, ranked 1st by the Times Higher Education World University rankings 2016-2017, the EH are given high importance as a diverse and emergent field of cross-disciplinary research that seeks to analyze and investigate the complex interrelationships between human activity (cultural, economic, and political) and the environment. Oxford University recognises that analyzing and addressing environmental issues requires a deep understanding of the reciprocal relationship between nature and humans (culture), and that between sciences, social sciences, and humanities. The study of EH is important not only in order to insert environmental issues more centrally into the humanities, as a fascinating and urgent intellectual enterprise but also equally important for scientists to be cognizant of the way in which human culture shape environmental impacts, environmental debates and regulation of all kinds [5].

Harvard University, ranked 6th by the Times Higher Education World University rankings 2016-2017, has a Centre of Environment which describes EH as a metadiscipline aimed at promoting the cultural transformations necessary for reducing ecological devastation within an increasingly uncertain and potentially traumatic future. The Harvard Global Institute Environmental Humanities Initiative (HGI EHI) is a multifaceted interdisciplinary research program focusing on how human communities from earliest times to the present, within and across national borders, grapple with ecological challenges and find solutions. At the University of New South Wales (UNSW) Sydney, EH is a cross-faculty integrated teaching and research programme that has developed a distinctive approach to this field, bringing together a uniquely interdisciplinary group of scholars with a grounding in history, philosophy, cultural studies, literature, science and technology studies (STS) and social theory, working towards a critical 'politics of nature'. EH is seen as an emerging interdisciplinary area of international research and teaching that addresses contemporary environmental challenges [6]. At the University of Utah, EH is a two-year degree programme that trains the next generation environmental leaders and thinkers. Students are encourage to reflect on a world of entangled human and other presences as well as to produce creative and scholarly exchanges towards new forms of environmental leadership and environmental justice [7].

In Universiti Sains Malaysia (USM), the School of Humanities (SOH) is championing the Environmental Humanities Initiative (EHI) as a new research cluster with the ultimate aim of establishing EH as an academic programme [8]. The core focus of EH typically includes social, cultural, ethical, historical, geographical, communication, and literary perspective (though not necessarily limited to these) in relation to the environment. In the SOH, EHI is relevant under the Accelerated Programme for Excellence [APEX] and USM's sustainability initiatives on Healthy Campus, University in a Garden, and USM Corporate Section's initiatives on sustainability [9]. EHI would be a niche area for SOH USM to can bring various disciplines and energy to a common platform. The SOH has visions that are closely related to EH. In the study of humanities, geography is most closely related to EH. Geography has four major traditions (or sub-fields) and one of the oldest traditions in geography is the human-environment tradition. This tradition marks geography as the first academic discipline to concern itself with the quality of the natural environment and how humans affect and change it [10]. Hence, geographers analyze how humans can be as much of a force shaping landscapes as natural forces, critically evaluating humans as "disturbing agents." Geographers also study the effect of nature/environment on human society, and how humans can adapt and free themselves from such influences. Geographers are qualified and well equipped to take on the EHI in SOH. Another field in the SOH that can contribute to EH is History (e.g. environmental history). Arguably, the relevance of history in EH is exemplified by the classic work of [11]. History tells us that the most profound effect of environmental disasters is civilization collapse which destroyed the environment along with ecosystems, flora and fauna [12]. Such large scale collapse is primarily caused by the inability to address human causes with solutions in EH. In the light of serious environmental problems threatening humanity (e.g. global warming and environmental pollution), historical studies on EH would help find solutions to counter environmental disasters/collapse. Other fields relevant in the study of EH are English, Bahasa Malaysia, Literature, Philosophy and Civilization and Islamic Studies. For example, the study of philosophy encompasses ethics, an important aspect of EH (e.g. environmental ethics) and environmental philosophy (EP).

ACHIEVING WATER RESOURCES SECURITY VIA ENVIRONMENTAL HUMANITIES

The story about water resources in Malaysia is a classic example of human mismanagement in an environment of resource abundance [13]. Malaysia is a country rich in water resources with an average of 2,940 mm of annual rainfall generating about 970.96 billion m^3 of water per year. Considering losses of evapotranspiration of 1,250 mm per year (412 billion m^3 of water), the country is still left with 1,500 mm of surface runoff (494.26 billion m^3 of water) and 192 mm of groundwater (61 billion m^3 of water) [14]. Based on these figures, the annual potable water consumption of is 5.277 billion m^3 in 2010 and represents only 1.07 % of surface runoff. The water used for agriculture which forms about 64.3 % of total water demands is about 9.512 billion m^3 or 1.92 % of surface runoff. Together, the total water demand in 2010 is 14.789 billion m^3 which is 2.99 % of surface runoff. Hence, in total, the country uses only less than 3 % of its total surface water available. Based on this scenario, one would consider Malaysia as a country without water stress problems. How can there be any water shortage when there is still 97 % water available amounting to 479.47 billion m^3? Another study reports that the country's water consumed in 2010 is only 2.98 % of surface runoff, and that expected to be consumed in 2020 is about 3.47 % [15].

Despite the fact that Malaysia is considered relatively rich in water resources, the country faces serious challenges in urban water management which has often erupted into full blown water crises [16, 17]. The international stress line recommended by the United Nations for water resources availability is about 1,700 m^3 per capita per year. Many countries have water resources availability below this line and are considered "water poor" or "water stressed". In 2014, data of some examples are Kuwait (0 m^3), Bahrain (3 m^3), United Arab Emirates (17 m^3), Saudi Arabia (78 m^3), Yemen (80 m^3), Israel (91 m^3), Jordan (92 m^3), Sudan (102 m^3), Singapore (110 m^3), Libya (112 m^3), Algeria (289 m^3), Tunisia (377 m^3), Kenya (461 m^3) and Lebanon (855 m^3) [18]. In comparison, Malaysia's annual per capita water resources availability is about 19,397 m^3. This is about 17,697 m^3 (1,041 %) above the stress line. With such a high amount of water resources, and if water problems still occur, it can be concluded these problems are not caused by nature or by lack of water resources but largely because of human mismanagenment. Some of these human caused problems have been identified as deforestation, high non-revenue water, low water tariffs resulting in public apathy towards water use and conservation, water wastage, reluctance of industry to adopt water recycling, water-saving fittings, and rainfall harvesting systems [19, 20].

Malaysia has also traditionally over-relied on Water Supply Management (WSM) as the key approach in managing water resources. This dominant approach of WSM, which is largely a top-down approach dependent on government or private sector water supply that excludes the involvement of water users, is not a sustainable method of water management. WSM addresses only the supply side of the problem, and water supply development has been shown to lag far behind water demands which double roughly every two decades. Malaysian society, including business and domestic sectors, use and waste a lot of

water. This is due to low tariffs, lack of incentives to reduce and recycle water, a consumerist lifestyle, amongst other reasons. Hence, in Malaysia as well as many other countries, WSM has been shown to be ineffective and unsustainable. Clearly there is a need to ensure water users use water more wisely. When carried our effectively, Water Demand Management (WDM) can save a lot of water and postpone the need for more new dams, treatment plants and inter-state water transfer for a decade or so. Clearly, there is a need to manage on the part of the supplier (WSM) as well as a need for consumers to manage water via WDM. Employing a single approach of WSM is clearly not solving the problem, as manifested in numerous water crises in the country in recent years. All water users need to be involved in a bottom-up approach in order for water resources to be sustainable. When all water users and stakeholders are involved in WDM, there will be immense water savings (not to mention monetary savings), ultimately realizing sustainable management of water resources and the evolvement of a "Water Saving Society" This is where the role of EH comes into play. WDM involves involving the water users and EH has a very important role to enhance public awareness, increase education and foster commitment. Only a well-informed and highly sentized public via EH can make WDM effective.

In terms of flood hazard management, the Drainage and Irrigation Department (DID) Malaysia which was initially set up to expand padi cultivation via irrigation, is considered the single most destructive agency that has drained most of the peat swamps and other wetlands in Malaysia and turned them into farm lands. This has reduced the countryside's absorptive/retention capacity for rains leading to subsequent flooding. It is ironical that the DID was later (after the major floods in the Klang Valley in 1971) entrusted with the responsibility of managing floods in the country [2]. Until today, despite billions being spent on flood management over the decades (MYR5.166 billion was spent over the 9th Malaysia Plan 2006-2010 [21], the problem of floods still remain unresolved. The DID, an engineering-based agency, only has engineering expertise. Integrated flood management must involve the public and this is where EH comes into play. There are many past incidents in which misunderstanding on the part of flood victims, flood managers and NGO helpers have resulted in disastrous consequences [2]. Structural flood control using engineering measures (e.g. dam or levee designs based on a fixed return period that is based on the assumption of a fictional static climate) can lead to disastrous consequences [22]. This is because climate change is occurring rapidly and is expected to dramatically increase flood risk. The inflexibility of "hard flood control" fixed on a specific design period is a major weakness that does not consider all the other stakeholders, viz. the humans. Furthermore, an optimal engineering solution may not be the best because of social, economic, institutional and political constraints. Increasingly, modern flood management must be comprehensive and inclusive. Comprehensive flood management involves the public and the victims (therefore EH) and is inclusive. A combined structural cum non-structural approach seeks to reduce damage to any size of flood and is adaptive in that it seeks to respond to the hydrological changes caused by climate change, changing land use and evolving river morphology [23]. Employing EH in flood risk management means that flood managers change their mind set to assume that floods will happen and that victims need to learn to cope and live with floods, and doing the best they can to protect property, crops and other assets, and get out of floods' destructive path when they occur [2]. Flood protection infrastructures are not infallible and people should be well prepared to face floods. Via EH, flood management is not about flood control but on adaptive understanding, coping mechanism and building resilience.

In terms of stormwater management, even with the introduction of MSMA in 2000 (Urban Stormwater Management Manual for Malaysia), many new technologies have yet to be studied in depth especially the interrelation between water quantity and quality. In malaysia, this study has shown that water pollution originates from many human-induced actions such as effluents from industrial wastewater, land use changes and urbanisation. There is an emerging transdisciplinary approach that utilises the understanding of relationships between hydrological, biological and human (EH) processes to improve water quality, biodiversity and sustainable development at the catchment scale [19]. Despite being touted as a "water-rich" country, the scenario has radically changed from one of relative abundance to one of relative scarcity. Population explosion, rapid urbanisation, agricultural expansion, industrialisation, tourism and other developments are imposing excessive demands and pressures on our water resources. At the same time, water availability is depleted by pollution. The authorities has concentrated on cleaning rivers via technical means (e.g. dredging) but this has limited success as it does not address the root "human" causes. It is imperative to change human behaviour to minimise pollution [13]. Examples from developed countries have shown that when the citizenry are highly aware, educated and sensitised, rivers can be restored back to their pristine conditions. When rivers are clean, water sources are clean and water security enhanced. This study highlights a combined research project that encompasses five sub-projects of which the core project which ties the rest together was the one involving EH. Results of the project are now used to guide innovate new approaches in urban water management in Malaysia.

CONCLUSIONS

The study of EH and technology advancement are intricately linked, and both have a role to play in addressing societal issues. Traditional structural approach cannot continue to be the sole approach as the environment, geography and people are experiencing complex changes. Water management should not solely rely on technical solutions as its problems are given birth by a combination of natural and human causes. In the humanities, researchers believe that merely adopting a technical solution will not solve the entire problem because they do not address the root causes, viz. human mismanagement and wastage, or the software. It is argued if human behaviour is changed from a wasteful and apathetic behaviour to a responsible and caring behaviour, water conservation will be successful. When the behaviour of an entire society or country towards water consumption is changed towards the better, a water saving society will be born. Likewise, for flood alleviation to be totally effective, both flood structures and human disaster response must be addressed. In countries where the citizenry are highly sensitised towards floods, water and environment, water security issues are effectively addressed. Such countries enjoy higher water savings, reduced flood losses and greater water security. For cleaner rivers, humans who pollute rivers must be educated as technical dredging of rivers does not address the root "human" causes. It is imperative to change human

behaviour to minimise pollution and restore them to their pristine conditions. When rivers are clean, water sources are clean, floods are minimised due to better drainage capacities and water security is enhanced. Society still needs technical and scientific water solutions to enhance water security but increasingly, the study of EH helps to bring greater effectiveness. A more comprehensive and inclusive strategy that seeks to highlight better and more affordable alternatives, can also help change human behaviour which is vital to ensure water resources sustainability and water security in Malaysia.

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