

City University of Hong Kong
30th Anniversary
Sustainability Summit: Pathways to a Sustainable Hong Kong

Note on contributors

The Thought Piece is a product of collective creativity, and the process exemplifies interdisciplinary collaboration and communication. Rounds of discussion in different settings that included the individuals below provided a solid foundation for the drafting process. Principal contributors to the final write-up are: Profs. Peter Brimblecombe, Rodney Jones, Yun-Wah Lam, Julie Li, Jane Prophet, Richard Walker and Xiao-Hu Wang. Contributors to the discussions include: Profs. Aditi Bhatia, Brian Boyd, Yuk-wah Chan, Jiayu Chen, Kimburley Choi, Christian Chun, William Chung, Surya Deva, Michael Edesess, Arthur Ellis, Robert Gibson, Istvan Horvath, Daniel Howe, Lawrence Khoo, Graeme Lang, Linda Li, Shan Li, Xiaowei Luo, Julie Mo, Anne Peirson-Smith, Hector Rodriguez, Han Shi, Tom Vinaimont, William Wan, Jeff Wang and Jane Yang. Robert Gibson and Sylvia So conducted background research and coordinated the consultation process.

Sustainable Policy-making: Introduction

Hong Kong has changed substantially in the thirty years since our University was founded. Table 1 compares the year before our founding (1983) with last year (2013). Government’s projections on population and age dependency in 2041, almost thirty years later, indicate an increase by an estimate of 17% and 31% from 2012 and 2013 respectively.

Table 1

People	1983*	2013*
Population (thousand)	5,345	7,241
Age dependency (People over 65 per 1,000 people aged 15 to 64)	102	183
Net reproductive rate per 1,000 women (A rate of 1,000 exactly replaces the population)	821	612
Consumption		
Ecological footprint (Global hectare per person)	2.6	4.7
Electricity (million megawatt hours per year)	14.0	42.6
Fresh water (million cubic meters per year)	598	935
Municipal Solid Waste (tonnes per day)	5,870	9,280
Economy		
Human Development Index	0.737	0.906
GDP per person HK\$'000 (at current market price)	40.7	295.7
GINI coefficient (based on original household income)	0.452	0.537
Environment		
Air quality - Haze: (Number of hours of reduced visibility per year)	267	978
Air Quality: SO ₂ emissions (ktonne per year)	90	33
Victoria Harbour compliance with Water Quality Objectives	75%	77%

*In items where 1983 and 2013 data is not available, the latest available data is used. See Appendix I for data sources and updated years.

We live in a world where resource constraints and pollution abound. How do we develop policies which will make our city sustainable and provide a good quality of life? That is, how do we make our city livable?

Many of the issues we face are long-term so we need policies which have strong backing in the community. Often these policies involve hard choices and trade-offs. We will thus need institutional mechanisms in place to *sustain* the application of the policies.

Our work leading up to the Summit, and the Summit itself, brings together academics from many disciplines and leaders from different sections of the community to consider how such sustainable policies can be developed and implemented. Our focus is on Hong Kong with comparisons to other East Asian and World cities. At the Summit there will be three forums:

1. Leaders from the *Arts and Humanities* will explain how their disciplines promote sustainability and livable cities by helping policymakers, citizens and other stakeholders clarify their values, priorities and ethical principles; articulate and communicate messages effectively; engage in critical debates; and formulate creative responses which involve new ways of thinking and inspire new ways of acting.
2. Leaders from *Business and Social Sciences* will discuss the awareness and action needed to create a sustainable economy which supports sustainable lifestyles with high levels of well-being.
3. Leaders from *Science and Engineering* will review how their disciplines contribute to the evolution of livable mega-cities in which sustainable lifestyles with high levels of well-being flourish.

The academic approach to the Summit constitutes three elements:

1. Interdisciplinarity

The Summit adopts an interdisciplinary policy orientation (sustainable policy-making and implementation), anchored in a specific context (Hong Kong and East Asia). The interdisciplinary approach cuts across the boundaries of disciplines, institutions and policy domains and brings together actors and institutions to enhance problem-solving collaboration. It emphasizes mutual learning between practitioners and academics—bridging science and society—to develop science for and with society solutions. An interdisciplinary approach to policy accentuates the resolution of problems and the importance of context, implements multiple methods, and has an overriding concern for human dimensions and values (Brewer 1999). Great strides have been made within the arts and humanities, business and social sciences, and science and engineering on questions of sustainability, and this will be showcased in the Summit.

2. Using ‘design science’ to devise policy solutions for problems in human society:

The Summit structure is designed to illustrate how multiple disciplines may contribute to a sustainable process of policy-making/implementation that will lead to more effective design of policies, greater efficiency in their execution, and

enhanced outcomes/impacts. Tackling questions of sustainability policies brings focus to the world of the artificial or human-made problems. These can be resolved through Herbert Simon's "sciences of design approach" (Simon 1996). A design science is geared toward solving complex real-world problems. Value judgments are constitutive of the process involving decisions on the design and evaluation of "institutions, mechanisms, and processes that convert collective will and public resources into social profit" (Shangraw and Crow 1989:156).

3. Applying policy solutions through institutions, mechanisms and processes which create the transformation required for sustainability.

Policy solutions have to be located in the real-life context within which the institutions, mechanisms and processes that are being adapted, or designed for improvement, are situated. Policy solutions have to strike at the heart of political processes and suggest societal transformation, "institutional imperatives" that focus upon strengthening public engagement in political decision-making (Spangenberg 2002). Evidence points toward the effectiveness of policy solutions that empower communities, involve processes of deliberative democracy, embrace stakeholders and seek government backstopping community efforts.

Arts and Humanities Forum: How the Arts and Humanities can contribute to sustainable policies and practices

Questions about the role of humans in the larger eco-system are central to the arts and humanities. These questions encompass issues relating to individual and social values, ethics, culture, history, aesthetics and the relationship of humans to one another and to 'nature'. Most of our most serious environmental problems have their roots in human behaviours, human desires, human cultures, and human relationships (Conway et al. 1999). Because of this, developing solutions to these problems requires more than just technical and economic expertise. It requires a deeper understanding of what it means to be human, a deeper discussion of what we value and what kind of world we wish to live in, and a deeper engagement with human imagination and creativity. It requires not just new technologies, new laws, and new economic initiatives, but, more importantly, new "states of mind" (Buell 2001), what one of our Summit speakers, Natalie Jeremijenko (2010), calls an 'eco-mindshift'. As critic Lawrence Buell (2005:vi) puts it, 'for technological breakthroughs, legislative reforms, and paper covenants...to take effect, or even to be generated in the first place, requires a climate of transformed environmental values, perception, and will. To that end, the power of story, image, and artistic performance and the resources of aesthetics, ethics, and cultural theory are crucial.'

Jeremijenko (2010) argues that underlying all of the material, economic and social problems surrounding sustainability is a deeper human problem, what she calls a crisis of agency: a feeling of individual and collective powerlessness in the face of 'shared, uncertain threats' that challenge our political systems, our scientific understandings, and our cultural imaginations.

What needs to be restored, for societies and for citizens, is a sense that we can act, and that our actions can make a difference. For artists, cultural critics and scholars in the humanities, our source of agency is not just our technological know-how or our economic resources, but our cultural resources as well, our stories, images, songs, histories, and spiritual and ethical principles.

The arts and humanities can contribute to bringing about this 'eco-mindshift' in three main ways:

- 1) by helping individuals and societies define their core values and ethical principles and understand how those values and principles relate to sustainable practices and policies;
- 2) by helping individuals and societies engage in critical debates about those values, practices and policies; and,
- 3) by helping individuals and societies formulate creative responses to environmental issues which involve new ways of thinking and inspire new ways of acting.

Being 'principled'

Any policy must begin with a discussion of fundamental questions of value, meaning, and mutual responsibility -- questions about what it is we consider 'good' as a society and what kind of world we wish to live in. No policy, no matter how well thought out, can be effective without 'a coherent vision of the common environmental good that is sufficiently compelling to generate sustained public support' (Buell 2001:1).

Such a vision must start by defining sustainability itself. Definitions of sustainability from a humanistic perspective emphasize more than just 'survivability' and 'development.' They also speak of higher goals like 'human flourishing' and 'quality of life', but these are ultimately very subjective terms. What counts as 'flourishing' for various people and cultures may be very different, and, as new technologies come along they change the way we define 'human flourishing' and 'quality of life; (and also bring with them new ethical dilemmas regarding how to achieve these things).

Underlying such questions are deeper philosophical questions about what it means to be human, the relationship between humans and the material world. Most industrial societies function under the implicit assumption that humans are rational, economic creatures who act out of self-interest, and that they exist apart from 'nature', which is viewed primarily as a 'resource' for humans to exploit. Australian philosopher Val Plumwood (2002) argues that the central task of the arts and humanities, when it comes to the environment, is to help break down this human - nature binarism, to re-situate humans within the environment and the non-human within culture. She and other environmental humanists argue that only by seeing humans as part of nature can we arrive at a 'thicker' notion of humanity, one which positions us 'in lively ecologies of meaning and value, entangled within rich patterns of cultural and historical diversity that shape who we are' (Rose et al. 2012:2).

Of course, within this more integrated view of humanity, there will remain a great variety of values, priorities and 'worldviews' among different groups including regional and local cultures, religious groups, age groups, and professional and disciplinary groups (like scientists, businesspeople and politicians). Recognizing these differences and sustaining cultural diversity is also an important aspect of sustainability, and needs to be balanced with the search for universal principles and the development of an ethos of "global humanity" and "planetary conscience" (Heise 2008). The recognition of cultural diversity is particularly important in pluralistic societies like Hong Kong, as well as in rapidly developing countries where the vibrancy of local cultures might be threatened by mass migration and the rapid growth of consumerism.

Ultimately, questions of sustainability are not just about abstractions like "nature" and "human flourishing", but about what kinds of responsibility we feel we have towards one another and how we organize our societies to meet these responsibilities. Any discussion of the ethics of sustainability must confront the fact that environmental degradation disproportionately affects the poorest and the weakest in our societies (Nixon 2011). And any policy that seeks to promote sustainability must address not just issues of economic development and ecological conservation, but also issues of social justice.

Being 'critical'

Sound environmental policy can only be formulated in a climate in which people feel comfortable questioning authority and 'speaking truth to power'. The arts and humanities have traditionally emphasized questioning and testing social policies and the values that underpin them. If we see sustainability as a matter of social justice, then one of the main goals of policy should be the political and economic enfranchisement of all stakeholders in a way that ensures that the conversation is not dominated by certain people and groups to the exclusion of others (as often happens in societies where media and key institutions are controlled by the wealthiest individuals).

Artists and scholars in the humanities can provide critical perspectives on our current institutions, policies and practices and help to facilitate a climate of vigorous debate. Being critical means more than just questioning particular policies or practices, but also critically evaluating more fundamental assumptions about things like 'growth' and 'consumption' that are part of neo-liberal political models.

Being critical also means being critical of the discourse of 'sustainability' itself (Lele 1991), especially when it is co-opted by special interests, exploited as an advertising ploy, or used as a subterfuge for increased profiteering and consumption (Rogers 2010). Helping to raise awareness about sustainability does not mean that artists and cultural critics need to endorse 'green' products and policies the way celebrities endorse soap powder. Rather, it involves providing citizens with tools with which to unmask and interrogate the real agendas and real consequences of so-called 'green' policies and 'green' products.

Building critical awareness in communities is a prerequisite for fostering meaningful social action. Addressing the crisis of agency that Jeremijenko speaks of must start with giving citizens more of a say in the decisions that affect them, but this involves not just getting policymakers to listen, but also getting citizens to speak, and an important part of that is equipping them with the critical literacy skills they need to evaluate their situations and to articulate their concerns.

While it is the traditional role of artists and intellectuals to challenge society, sometimes in unsettling ways, this role should not be seen as contentious. The best policies usually arise not out of comfortable consensus, but out of the tensions that are created through constructive critique.

Being 'creative'

Perhaps the most important thing that artists and humanists have to offer is their capacity to inspire new ways of thinking about problems that involve creative intellectual leaps, heightened curiosity and increased risk-taking. Increasingly, creativity is recognized as a crucial factor in solving complex problems, giving us the ability to synthesize and reconfigure knowledge and resources in new ways, to gain new understandings of what was previously taken for granted, and to collaborate, share and compare different perspectives.

The power of creativity to raise awareness and spark debate can be seen in many examples of socially engaged art, film and literature. But creativity also contributes to addressing issues of sustainability in more applied arts, in the design of urban spaces, fashion and objects for everyday use. In nearly every profession and industry, in fact, there is increasing awareness of how small decisions about design can have large impacts on people's behaviour and the way they think about consumption.

At the same time, journalists, educators and interaction designers are involved in creating new ways of speaking and communicating about sustainability, sometimes harnessing the new affordances offered by digital media, inventing new ways of telling stories and reclaiming old ways. In schools and universities, literacy educators are teaming up with scientists, engineers and ethicists to instil in students a new kind of literacy, an 'eco-literacy' (Capra 1999), which focuses on developing creative ways to communicate about sustainability.

Art does not just deliver powerful messages that challenge indifference and inspire action. In fact, it is sometimes even more effective in the more subtle ways that 'reframe' our everyday experiences. This is dramatically illustrated in the public installations of artists like Jeremijenko, whose work interrupts people's everyday actions and interactions, 're-scripting' them in ways that reveal our interdependence and the power of collective action. It is these small, incremental 'mindshifts' that can eventually add up to the larger more radical shifts in attitude and priorities that will be necessary to create cultures of sustainability. As Singaporean theatre director Ong Keng Sen puts it, 'the arts can make

every individual personally responsible for his or her actions through inspiring dialogue, through negotiating conversation, through enhancing the human dimension, through igniting the imagination' (quoted in Wilson 2011:16).

Recommendations and Conclusion

Above we have argued that the arts and humanities have a crucial contribution to make to the formulation of effective public policy on sustainability, especially in the areas of clarifying core values, offering constructive critiques, and formulating creative approaches to changing individual and societal mindsets. The arts and humanities can contribute to promoting deeper awareness and reflection, inspiring creative problem-solving, and creating a sense of civic engagement. As Hong Kong activist Ada Wong (quoted in Wilson 2011:9) argues, 'The cultural sector is a natural change agent, instigator and provocateur in paradigm shifts and mindset changes.'

But what are the practical implications of these observations for policymakers, particularly in the contexts of Hong Kong and Greater China, where rapid economic growth and urbanization, as well as a widening gap between the rich and poor, have put pressure on both ecological and social systems? We offer the following recommendations:

First, policymakers should double their efforts to protect and preserve space for open debate about sustainability where the voices of people from all sectors of society can be heard, especially the voices of those who are most vulnerable to the effects of environmental degradation.

Second, policymakers should give environmental ethics the same weight as economic considerations and attempt to formulate policies that do not just preserve the status quo of economic growth and consumption but also promote justice and preserve the cultural diversity and heritage of citizens.

Finally, policies should be formulated and resources should be made available to encourage a flourishing of art which raises public awareness about sustainability and inspires critical reflection and behavioural change.

The most important work, however, must be done by artists and cultural critics themselves, along with scientists, engineers, business people, and the public, to increase opportunities for dialogue and collaboration. No one sector of society or academic discipline possesses all of the tools necessary to tackle the complex problems associated with sustainability. Facing these challenges will require breaking down disciplinary boundaries, learning from one another, and finding common ground.

Questions to consider:

1. How do we reconcile issues of scientific, economic and humanistic values in debates about sustainability?
2. What responsibilities do we have to different stakeholders, to future generations and to the rest of the biosphere in formulating policy regarding sustainability?

3. How can we create an environment conducive to deliberative public debate about sustainability that is both critical and civil?
4. What role do questions of justice, equality, and ethics play in policymaking about sustainability? How do people from different cultures understand the relationship between humans and the environment, and how can different cultural perspectives be drawn into public debates about sustainability?
5. How can media and the arts (including print publications, graphic arts, performance arts, digital arts, music, film, and television) contribute to informing and instructing people about environmental issues and environmental policy, to provoking them to think critically and creatively about these issues, and to inspiring them to take individual and collective actions?

Business and Social Sciences Forum: *Awareness and action to create a sustainable economy*

Why do we want a sustainable community? What does “sustainable development” mean to you? How do you contribute to the goal of sustainability when you recycle, use energy-efficient appliances, or take public transportation instead of driving a car? Sustainability is about the quality of life in a community. It is about whether the natural environment, the economy, and the social system that make up our community are providing a healthy, productive, meaningful life for all community residents, present and future.

Why do we want a more sustainable Hong Kong? How should business and social sciences communities participate in making Hong Kong a more sustainable city?

- Do you know that Hong Kong is one of the most wasteful cities on the planet in that we generate more rubbish per person than many other cities? Yet, it is one of the few advanced economies not charging as yet for residential municipal waste disposal. Substantial room exists in our research and practice to reduce residential municipal waste.
- Do you also know that Hong Kong uses more water per person than most advanced cities? However, Hong Kong only has a very limited water supply. The water supply largely comes from outside of Hong Kong.

Over-consumption of scarce resources has negative economic and environmental consequences and causes security concerns as well (James and Scerri 2011; McDonough and Braungart 2002). Indeed, environmental issues such as air pollution, water quality, and waste collection cause serious concerns among Hong Kong residents. Yet the government spends less than 6 percent of its budget on the environment. Hong Kong’s political environment and governing structure limit civic engagement in the decision-making process. Sustainability is a practice that addresses the social, economic, and environmental needs of present and future generations.

Sustainability concerns every one of us, which is why sustainability needs action by all of us. This is why this forum is important. It asks you, all of us, to generate ***Awareness and Action to Create a Sustainable Economy.***

The concept of a sustainable economy exemplifies a change in the theoretical understanding of economic development from a bottom line to a “triple bottom line” (Elkington 1997). The latter suggests a broader scope of development and goes beyond the accumulation of materials and profit to take into account the externalities and ‘soft’ aspects of well-being, such as air quality, health, and resources efficiency (Beckmann et al. 2011; Ekins et al. 1992). A sustainable economy requires the collaboration of multiple stakeholders across business, society and government.

Hong Kong, as elsewhere, has a rising awareness of environmental protection, product sustainability, resource efficiency, and protection of natural resources. Some firms have already taken initiatives to adapt their approaches to governance, strategy development, and business model creation. There is a new emphasis on natural capital and business growth, waste management and business opportunities, social welfare and business responsibilities. However, there is a lack of broad understanding of the connectedness and conflict between economic development and sustainability. Often, sustainable development is still placed in opposition with economic growth (Chappell 1996). It is seen as something that is good to have so long as it does not undercut economic growth. This can lead to a polarization of views over priorities, creating opposing camps of ‘developmentalists’ and ‘conservationists’ that increase the chance of policy stalemate and frustration of all parties (Bakari 2014). The challenge is to discard the counter-productive winners-losers mindset in the policy process to enhance the alignment of suppliers’ and consumers’ interests. While many have recognized the need for sustainable development, gaps remain in translating the awareness of sustainability issues to action on them in business and consumption decisions. For example, while the community welcomes the idea of reducing energy wastage, there is a worry about energy security and increasing energy costs. How can we close these gaps so as to bridge knowledge, awareness and action? How can we bring the various actors with diverse views together to work collaboratively toward sustainability? When views differ and interests diverge, how may a compromise emerge that is a win-win for all parties?

Sustainable economics has transformed many assumptions in economic theories. Sustainable policy and action demands insights into actors’ incentives, group formation and inter-group interactions from politics, sociology and other social sciences. Ultimately, these insights and policy discussions will be structured by existing legal notions and frameworks that will continue to evolve, informed by such inputs.

Questions to consider:

1. How can the concept of ‘sustainable economy’ be crafted to encompass diverse views on development?
2. What is sustainability and what are the responsibilities of business?

3. What is the role of civil society including educational institutions?
4. What are the internal and external factors that influence the formation of sustainable policies?
5. What government policies can promote the creation of sustainable business models?
6. What can we learn from failed and successful examples of practices in HK that reflect movement toward a sustainable economy?
7. What social mechanisms and policy processes may motivate individuals/organizations – whether as producers or consumers - to take actions which make our economy more sustainable?
8. How should government processes be adjusted to create policies which are (a) good and long-lasting; and (b) adequately address sustainability challenges.
9. How can we make capitalism (business decision-making) more sustainable?

Science and Engineering Forum: *How to build a livable mega-city*

It is inevitable that the city will be the dominant space for the future of humanity, yet there have been tension between town and country for 4000 years (e.g. Epic of Gilgamesh). It has been easy to see the country as innocent and natural as opposed to the city, which is seen as sophisticated, yet corrupt and vice-ridden. Such tensions are often repeated within modern environmentalism, where the country becomes valued for its unpolluted naturalness, while the city is portrayed as a source of pollution and waste. Large cities are viewed as parasitic on the countryside, which its citizens know little about. Even when aiming to be sustainable, large cities can attract resources to promote their sustainability at great cost to smaller cities with lower political visibility.

The rise of the mega-city has been a particular transition in recent decades such that more than ten largest agglomerations have populations in excess of 20 million. Only one, Mexico City, lies outside Asia, which makes an understanding of mega-cities a particularly pressing challenge for our region.

Many mega-cities have grown organically, rather than being planned. They sprawl into the countryside and grapple with environmental problems such as air and water pollution and enormous volumes of domestic and industrial waste. Traffic congestion can be so severe that daily travel times can extend into hours. However, a positive view of cities develops from contemporary notions of New Urbanism and the sustainable or eco-city. These aim to minimize cities' contributions to climate change, and to producing little pollution; they compost and recycle materials, encourage urban agriculture and convert waste to energy. They take advantage of the high population density to have a small ecological footprint. Such plans are a reaction against the rationalists who so influenced mid-century modern design of cities with a focus on automobiles, suburbanization and material affluence (e.g. Jacobs 1961). However urban communities can be extremely vibrant and it is especially

notable how cities rapidly define districts and villages; this is a structure that reflects heterogeneity on a range of scales. This leads to a heterogeneity that adds richness and liveability to the urban environment.

Hong Kong needs clean air. It also needs a sustainable and secure supply of energy; water and food are full of challenges. As we have seen in the case of energy, this involves difficult choices. Current options for Hong Kong involve rather conventional approaches and have not been able to incorporate carbon capture or drastic reductions in energy demand. The city also produces large quantities of sewage and solid waste, but it is unclear how to make the best policy decisions to ensure that their impact on the environment is minimized.

Scientific analysis can help us understand the constraints under which a city operates. It addresses questions about optimum size (Dewan 2011) and about structure to minimise the use of resource and creation of pollution, while maximising efficiency. Science also provides the basis of new technologies that improve the energy efficiency of buildings, enhance the yield of urban agriculture, and increase the attractiveness of renewable and carbon-neutral sources of energy and of recycled water.

Science has not always played a big part in Hong Kong's policy development, yet the complexity of sustainability issues makes its role more important in the future. Science can also provide an improved understanding of the urban environment and the accompanying technology allow cities to be more livable. As an example, new technologies can replace larger institutional structures, such as environmental monitoring networks or energy tracking systems, with community monitoring or household energy tracking. A recent improvement is Hong Kong's new Air Quality Health Index, with which people can moderate their exposure to air pollutants with a mobile phone app.

Sustainable cities draw upon innovative technologies and improved understanding of a complex environment. The forum sub-theme *How to Build a Livable Mega-city* considers the questions that emerge as we try and interface scientific understanding with policy making to make our city not just sustainable but also offering a high level of well-being. Our region provides an important case study. Scientific and engineering advances have effectively reduced the physical distance between previously dispersed communities. The Zhuhai-HK-Macau bridge is an example of such a development, leading to the emergence of the HK-Macau-Shenzhen-Zhuhai-southern Pearl River Delta area as a mega-city-in-the-making. However, there are also dangers as bridges can be born of politics rather than sustainability (Winner 1986, but also Joerges 1999).

We have to make cities work... They are where the great majority of humanity will live...

Questions to consider:

Characteristics of a livable city:

- 1 What can science contribute to the understanding of urban metabolism and optimum city size? In particular what is the optimal height and density to which city districts should be constructed? Will this height and density change in the future as construction materials and our understanding of urban micro-climates improve?
- 2 How will the technological innovation needed to make Hong Kong more sustainable change the city? For example:
 - a. How can Hong Kong's energy and water consumption be reduced?
 - b. How can the carbon intensity of Hong Kong's electricity be reduced? What is the long-term potential for renewable energy and how might this affect the design of the city?
 - c. Where will Hong Kong get its water from in the future?
 - d. How can Hong Kong produce more of its own food? How much role will there be for advanced aquaculture, cultivating algae in vats, aquaponics and other forms of urban food production?
 - e. What long-term changes might there be in transportation within the city? Will private cars gradually be phased out?
 - f. How will Hong Kong treat its waste so that it moves much closer to having a circular economy?
 - g. How will the need to reduce carbon emissions change the scale and nature of international trade and travel?
 - h. What impact will coping with sea level rise and ocean acidification have?
- 3 How might technological advances be managed so as to contribute to enhancing the appeal and capacities of a mega-city?
- 4 What can we learn from failed and successful examples of mega-city formation?

The role scientists and engineers play in formulating policies for a livable mega-city:

- 5 How does science contribute to the policy challenges arising from the mega-city?
- 6 What role should scientists and engineers play in journalistic coverage of their areas of expertise? Are institutions such as a Science Media Centre beneficial?
- 7 How can scientific advisers to government departments contribute to sustainable policy-making?
- 8 To what extent can technology help to find answers to such challenges of mega-cities as sustainability and reconciliation among different local conditions and practices?

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Appendix I

Data sources and data available years of Table 1

	Data source	Available year nearest to 1983	Available year nearest to 2013
People			
Population	1983 data, Demographic Trends in HK 1981 – 2011, www.statistics.gov.hk/pub/B1120017032012XXXXB0100.pdf 2013 data, HK Government Hong Kong Population Projections 2012-2041 www.info.gov.hk/gia/general/201207/31/P201207310344.htm	1983	2013
Age dependency	1983 data, Demographic Trends in HK 1981 – 2011, www.statistics.gov.hk/pub/B1120017032012XXXXB0100.pdf 2012 data, Report of the Working Group on Long-Term Fiscal Planning http://www.fstb.gov.hk/tb/en/report-of-the-working-group-on-longterm-fiscal-planning.htm	1983	2012
Net reproductive rate per 1,000 women	HK Monthly Digest of statistics, www.statistics.gov.hk/pub/B71312FA2013XXXXB0100.pdf	1983	2012
Consumption			
Ecological footprint	Worldwide Fund Hong Kong, http://awsassets.wwfhk.panda.org/downloads/hong_kong_ecological_footprint_report_2013.pdf *Global hectare per person – it is a way to standardize the measurements of the ecological footprint and biocapacity and to make global comparison possible. Figures are expressed in global hectares (gha) which refer to hectares of productive area with world average biological productivity in a given year.	1983	2008
Electricity	HK Environmental Protection Department, www.epd.gov.hk/epd/english/environmentinhk/water/marine_quality/mwq_report.html	1986	2012
Fresh water	1983 data, Hong Kong's water, by Water Supplies Department. 1993 2012 data, HK Census and Statistic Department, www.censtatd.gov.hk/hkstat/sub/sp140.jsp?productCode=B1010003	1983	2012
Municipal solid waste	1986 data, Monitoring of Solid Waste in Hong Kong 1997, https://www.wastereduction.gov.hk/en/materials/info/msw1997.pdf 2012 data, HK Census and Statistic Department, www.censtatd.gov.hk/hkstat/sub/sp140.jsp?productCode=B1010003	1986	2012

Economy			
Human development index	UNDP Human Development Report 2013, http://hdr.undp.org/sites/default/files/Country-Profiles/HKG.pdf	Interpolated from 1980-1985	2012
GDP per person	HK Census and Statistics Department, www.censtatd.gov.hk/hkstat/sub/sp250.jsp?tableID=030&ID=0&productType=8	1983	2013
GINI coefficient	Half-yearly Economic Report 2012, www.hkeconomy.gov.hk/en/pdf/box-12q2-5-2.pdf	1983	2011
Environment			
Air quality – Haze	HK Observatory, www.weather.gov.hk/cis/statistic/hko_redvis_statistic_e.htm	1983	2013
Air quality – SO2 emission	HK Environmental Protection Department, www.epd.gov.hk/epd/english/environmentinhk/air/data/emission_inve.html#3	1984	2012
Victoria Harbour compliance with Water Quality Objectives	HK Environmental Protection Department, www.epd.gov.hk/epd/english/environmentinhk/water/marine_quality/mwq_report.html	1986	2012