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Survey study on attitudes to multi-dimensional sustainable development ladder with UK MSc Students

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Abstract: As reflected in the sustainable development goals (SDG), sustainable development is a multi-dimensional concept integrating political, ethical, economic and other factors. Reports from the UN decade of Education for Sustainable Development (UNDESD) suggest that universities are more engaged with sustainable development in higher education (HESD). Despite promising signals about student awareness of sustainable development, survey studies suggest student engagement and knowledge is limited in addressing social and economic factors. This study evaluated how UK students enrolled in postgraduate taught sustainability degrees responded to the multi-dimensional issues of sustainable development. Consolidating work by Baker on the multi-dimensional ladder of sustainable development, this study piloted a 39 question 7-point Likert scale survey with a cohort of UK taught postgraduate (MSc, MPhil) students (n=121, Cronbach Alpha 0.796, n=39 Questions). Subsequent removal of questions duplicating content and replacement of missing values produced better results (0.810 Cronbach Alpha, n=30 Questions). The study found this cohort able to recognize and respond to the multiple challenges of strong and weak sustainable development issues. Results also suggest that future studies could limit the number of questions Results and qualitative comments from the survey suggest, however, students resist the idea of strong interventions in social, political and economic life.

Keywords: education for sustainable development, postgraduate students, United Kingdom, survey study

Introduction

The UN decade of Education for Sustainable Development (2004-2015) aimed to develop greater impact of principles and practices in education globally. In higher education specifically (HESD), results however indicate mixed outcomes in terms of the depth of engagement of universities, students and faculty. In the second interim report, Wals (2012, 86) concluded that colleges and universities around the world are starting to make more systemic changes towards sustainability amidst educational reforms towards efficiency, accountability, privatization, management and control that often hamper their efforts .

ESD in Higher Education

Ashford (2004) has suggested that important concepts and values of ESD, including ideological challenges to mainstream approaches, can be swallowed up by the restrictions of institutional curriculum constraints. These are 'arguably undergoing a process of neo-liberalisation' (Sylvestre, McNeil, and Wright 2013, 1358). Thus, the acceptability of value-laden commitments to sustainability is a fraught issue in university contexts of academic neutrality and increasing industry relationships (Mulder 2010). These pressures have lead mostly to the mainstreaming of conventional ecological modernisation arguments in ESD (e.g. Coffey and Marston 2013). Thus, Amador et al (Amador et al. 2015) note the slow institutionalization of ESD is due to the resistance of universities to addressing the

ideological and political challenges strong sustainable development commitments suggest, e.g. alternative economics. This and other obstacles suggest that we are still some distance from developing transformative ESD courses that challenge the mainstream (for example see Sipos, Battisti, & Grimm, 2008).

Postgraduate taught courses integrating sustainability offer a particular environment to enrol committed and engaged international student cohorts to explore alternative approaches. Students bring beliefs and attitudes to such courses and their education and experiences may subsequently be challenged (Grierson and Hyland 2011; Naeem and Peach 2011; Stubbs and Cocklin 2008). In addition to a disciplinary focus, such courses often integrate (elective or compulsory) units addressing the broader social, environmental and economic questions of sustainable development. Such a foundational unit was a selection criterion for the institutions and programmes selected in this study.

Student attitudes to sustainability and development

Previous studies have focused primarily on undergraduate university cohorts in different disciplines or as a generic cohort. Most identify weaknesses in student understanding of social versus environmental and economic issues.   They also identify weak commitments of students and limited development in understanding across year levels. Poor connections with campus greening initiatives were also a weakness. Few studies have surveyed postgraduates and none has explicitly asked students to evaluate their principled commitments to strong and weak sustainable development ideas.

In the first global survey study (45 questions) of engineering students (n=3134) across multiple institutions Azapagic et al (Azapagic, Perdan, and Shallcross 2005) found that knowledge and recognition of environmental principles was at a level of 'heard about but could not explain'. The authors noted poor knowledge of environmental legislation, policy and standards, no difference in knowledge between year levels and 'significant knowledge gaps exist with respect to the other two (social and economic) components of sustainable development' (Azapagic et al., 2005, p. 16).

Kagawa (2007) surveyed Plymouth University students (n=1889) finding limited in depth knowledge and strong association of the idea with environmental rather than economic or social concepts. The study also found a 'light green' approach among students to sustainable changes, e.g. beliefs in recycling. In their study in Turkey, Tuncer (Tuncer 2008) found all students, irrespective of whether they were in a sustainability-oriented course or not, were interested in committing to sustainable lifestyles, although no specifics were given on how they would do this. They also note that campus initiatives, e.g. recycling, have had limited uptake. In their Malaysia based study (n =379) Nejati & Nejati (2013) found that students associate a sustainable university with activities that are rarely practiced on campus.

In an annual repeated study across first and second year UK students (n=3845) an HEA academy report (Drayson et al. 2014) identified interest in students in learning about sustainable development, limited desire to participate directly in environmental actions or initiatives and some preparedness to sacrifice earning potential to work for an ethical company. Other surveys of students have produced similar results regarding enthusiasm for sustainable development albeit with mixed results concerning knowledge gaps and actual practice (e.g. Barth and Timm 2011). These studies while useful focus on undergraduate student cohorts.

Few studies have focused specifically on postgraduate taught students. While some authors describe the development and implementation of Masters courses these discussions do not focus on student perceptions (Fenner et al. 2005). The small case-control study by Brody and Ryu (Brody and Ryu 2006) from the USA did find that following a postgraduate course in sustainable development that students reported reducing their ecological footprint significantly. Corney's open pro-forma and interview study (Corney 2006) of postgraduate teacher education students (n=19) indicated inter alia serious doubts about introducing more radical strong notions of sustainable development into school contexts. Zeegers & Clark (Zeegers and Clark 2014) employed student reflective journals (n=34) from Masters Students in Australia (an international cohort) finding that despite being exposed to the multi-dimensional challenges of sustainable development most students remained with an envirocentric view. They also note that the complexity of the subject matter including with regard to the political,

economic and ideological issues, makes it a challenge to teach. Hesselgbarth & Shaltegger (Hesselbarth and Schaltegger 2014) in a recent study of MBA graduates in sustainability in Germany find that students report that the concept is mainstreamed in relevant industries, e.g. car production.

In sum, these studies altogether suggest a general 'dissonance' in student attitudes to sustainability and sustainable development with limited acknowledgement of the multidimensional nature of the processes. General student knowledge and attitudes seem favourable but uninformed about the specifics of sustainable development. This study aimed to further evaluate this weak knowledge claim by asking a multi-institutional UK postgraduate cohort of students to position themselves with respect to the multi-dimensional ladder of sustainable development (see below). No studies to date have based surveys on an articulated view of the multidimensional nature of strong, weak and mainstream approaches to sustainable development.

Strong and weak sustainable development paradigms

Since the Bruntland formulation and the mainstreaming of sustainable development through global agendas such as the MDGs and national policies, there is increasing recognition that the concept admits strong and weak versions. Mainstream sustainable development as typified by the Our Common Future embodies mixed strong, weak and populist discourses to strike a compromise (Adams 2009). Ecological economics and strong sustainability environmental focuses on critical natural capital and (non)substitutability, where this 'is responsible for important environmental functions and which cannot be substituted in the provision of these functions by manufactured capital' (Ekins, Simon, Deutsch, Folke, & De Groot, 2003, p. 169). Despite criticism of the ambiguities in both terms – sustainability and sustainable development (e.g. Lele, 1991), beyond environmental thresholds (mentioned) envisioning alternative futures issues in the latter brings many more factors into play, e.g. approaches to technology, politics and government, etc. These are captured in more recent articulations of sustainable development

Ladder of Sustainable Development

The political, economic, ethical and other concepts, have been plotted as a continuum or 'ladder' of sustainable development as developed by Baker[i] (2013), across an anthropocentric and eco-centric continuum (see table). These are distinguished by their appeal to different normative principles, attitudes to nature, spatial focus (e.g. local vs. global), type of development (e.g. attitudes to consumption), approaches to governance, belief in technology, policy integration and tools, and civil society state relationships, i.e. far more than attitudes to critical natural capital. Survey instruments that build on the multi-dimensional consequences of strong (eco-centric) and weak (anthropocentric) positions are being explored by researchers (Kopnina, 2014). This study employed Baker's (2013) ladder to systematically reflect these multiple dimensions and evaluate postgraduate student knowledge and attitudes to these.

Baker divides the continuum into four broad 'models' from a deep green ideal model to a pollution control market environmentalism. As indicated in the table below this allows for a 9 x 4 matrix of cells (n=36) across eco-centric and anthropocentric approaches. Initial development of the questionnaire included at least one survey question per cell plus three, which provided alternative perspectives on the topics. Subgroups of questions (as itemized below) addressed eight areas of relevance. The content of specific survey questions, however, asked individuals to choose a position across the continuum relative to specific topics, e.g. globalization, and thus content coverage was duplicated in areas that affected the Cronbach Alpha for reliability and factor analysis (as explained below). Future survey development would offer a reduced number of questions

Table 1: Ladder of Sustainable Development (Baker, 2013)

The Ladder of Sustainable Development: The Global Focus

Model of sustainable development	Normative Principles	Type of Development	Nature	Spatial Focus	Governance	Technology	Policy Integration	Policy Tools	Civil Society: State Relationship	Philosophy
Ideal Model	Principles take precedent over pragmatic considerations (participation; equity, gender equality, justice; common but differentiated responsibilities)	Right livelihood; meeting needs not wants; biophysical limits guide development	Nature has intrinsic value; no substitution allowed; strict limits on resource use, aided by population reductions	Bioregionalism; extensive local self-sufficiency	Decentralisation of political, legal, social and economic institutions	Labour-intensive appropriate, green technology; new approach to valuing work	Environmental policy integration; principled priority to environment	Internalisation of sustainable development norms through on-going socialisation, reducing need for tools	Bottom-up community structures and control; equitable participation	**Ecocentric**
Strong Sustainable Development	Principles enter into international law and into governance arrangements	Changes in patterns and levels of consumption; shift from growth to non-material aspects of development; necessary development in Third World	Maintenance of critical natural capital and biodiversity	Heightened local economic self-sufficiency, promoted in the context of global markets; green and fair trade	Partnership and shared responsibility across multi-levels of governance (international; national regional & local); use of good governance principles	Ecological modernisation of production; mixed labour- and capital-intensive technology	Integration of environmental considerations at sector level; green planning and design	Sustainable development indicators; wide range of policy tools; green accounting	Democratic participation; open dialogue to envisage alternative futures	
Weak Sustainable Development	Declaratory commitment to principles stronger than practice	Decoupling; reuse, recycling and repair of consumer goods; product life-cycle management	Substitution of natural capital with human capital; harvesting of biodiversity resources	Initial moves to local economic self-sufficiency; minor initiatives to alleviate the power of global markets	Some institutional reform and innovation; move to global regulation	End-of-pipe technical solutions; mixed labour- and capital-intensive technology	Addressing pollution at source; some policy co-ordination across sectors	Environmental indicators; market-led policy tools and voluntary agreements	Top-down initiatives; limited state-civil society dialogue; elite participation	
Pollution Control	Pragmatic not principled approach	Exponential, market-led growth	Resource exploitation; marketisation and further closure of the commons; nature has use-value	Globalisation; shift of production to less regulated locations	'Command and control' state-led regulation of pollution	Capital-intensive technology; progressive automation	'End of pipe' approach to pollution management	Conventional accounting	Dialogue between the state and economic interests	**Anthropocentric**

Material and Methods

This study focused specifically on postgraduate (MSc/MPhil) students in Environment & Sustainability taught programs where a sustainable development unit was taught explicitly along with other disciplinary foci.

Survey design and development

The ladder of sustainable development was used to develop a draft set of questions, which aimed to reflect all aspects of the framework (content validity) and based on pilot and participant responses appeared to have face validity (see appendix below). The questions were modified following feedback from two anonymous reviewers and the survey then submitted in pilot form to students at Swinburne University for further evaluation and comment. This feedback provided further inputs, which were incorporated into the final version of the survey, included in the appendix.

The questions address several dimensions of sustainable development and were polarized to provoke positioning on a seven point Likert scale. Some questions overlap in content focus and this is indicated below for composite scoring and statistics. According to the ladder description above, most but not all survey questions were either strongly polarized towards eco-centric or anthropocentric positions. In conducting reliability analysis, creating composite scores and EFA some questions were transformed

Institutions and programs

Ten institutions responded to the invitation to participate, which included an onsite visit to a lecture where students and lecturers were present. Many respondents did not indicate which program or institution they came from. Students recruited to the survey were undertaking a unit (either compulsory or elective) addressing the human and material aspects of sustainable development.

Institution	Example Program(s)	No
Bath University School of Management	MSc in Sustainability and Management	01
Brunel University	Sustainability, Entrepreneurship & Design MSc	06
Cambridge University School of Engineering	MPhil Engineering and Sustainable Development	14
Edinburgh University Edinburgh College of the Art	Advanced Sustainable Design (MSc)	03
Cardiff University School of Architecture	Theory and Practice of Sustainable Design (MSc) Sustainable Mega Buildings (MSc)	05
Glasgow University Adam Smith Business School	Environment & Sustainable Development MSc Sustainable Energy MSc	01
Lancaster University Environment Centre	MSc Energy and the Environment MSc Vulcanology	11
Strathclyde University School of Civil Engineering	Environmental and Sustainability Studies MSc Global Sustainable Cities MSc	20
UCL Faculty of the Built Environment (Bartlett)	MSc Environment and Sustainable Development	03
University of Edinburgh School of Geosciences	MSc in Environmental Sustainability MSc Sustainable Resource Management	15

University of London SOAS	MSc Sustainable Development MSc Poverty Reduction	15
Unstated		27
Total		121

Results and analysis

Through recruitment at ten UK institutions (table 2) the study obtained a sample (n=121) to conduct an exploratory translation of the multiple dimensions of the ladder. We also conducted statistical analyses that had not previously been used, e.g. EFA and reliability analysis. With an integrated consent form, the survey was advertised on various channels including face to face on campus. This recruitment strategy elicited a varied response rate, which suffered a 6.6-9.9% loss in sections of the survey. This was addressed using Expected Maximization (EM), as outlined below.

Missing Values and Reliability Analysis

Following Little's MCAR test to test for random missing values (Chi-square 125.832, DF=191, Sig 1.000) the study used Expected Maximization (EM) to replace these. As a result reliability analysis increased the Alpha score from 0.772 to .796 (n=39). Subsequently removal of nine questions, which overlapped existing questions in content significantly raised Cronbach Alpha to 0.819 (n=30). EFA on this subset produced a smaller set of factors. The subset were VARIABLES=Q4 Q5 Q6 Q9 Q10 Q11 Q12 Q14 Q15 Q17 Q18 Q19 Q20 Q21 Q22 Q25 Q26 Q27 Q28 Q29 Q30 Q31. Exploratory Factor Analysis (EFA) was conducted a subset of survey variables (n=30), which produced the best Cronbach Alpha reliability. This produced nine factors explaining 65% of variance, with the first two factors dividing between strong and weak positions, and collecting questions oriented to these two positions.
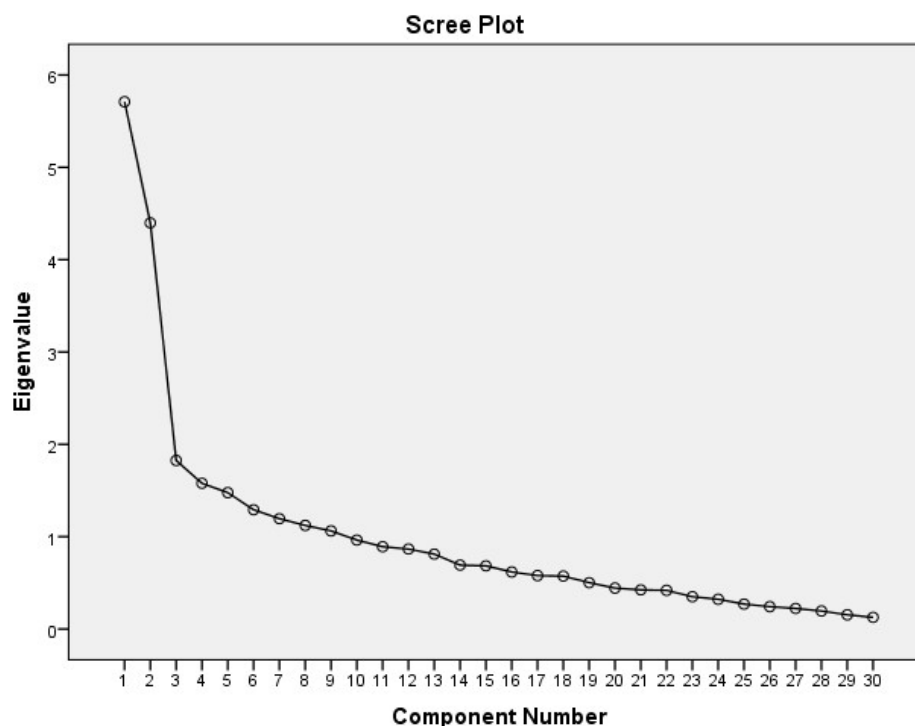

Figure 1: Scree Plot for Factor Analysis

Thus, the factor analysis seemed to corroborate the claim that sustainable development was multi-dimensional in the sense described above. It also (weakly) suggested that the strong and weak continuum points were significant attractors. As noted below, future refinement of the questionnaire

to reduce questions and overlapping content might produce even clearer factor loadings and improved reliability.

To illustrate an initial measure of variation and consensus on specific issues, range, mean and standard deviation of individual items (n=39) was calculated (as shown in table below). Items with high means (or low if negatively polarised), narrow ranges and smaller standard deviations indicating greater consensus. Individual items with both wide ranges, larger standard deviations and 'inconclusive' means indicated more contentious issues among this cohort. Unfortunately, while a gender and institutional categorical variable was included (for Chi Square) there were too many missing values.

There was a high degree of consensus about principles, general strategies, e.g. legislation, and practices. Thus, there was high agreement about principles of equity, needs versus wants, natures intrinsic value and the importance of biodiversity. In addition, the need to legislate, regulate and employ relevant tools, e.g. EIA, also were relatively undisputed. Concepts which suggested a starker dichotomy, e.g. practical versus principles, importance of market led growth, locally appropriate farming, generated more disagreement and varied responses as indicated by range, mean and standard deviation. Means between 3-4 typically with high SD tended to show rejection of the proposition (whether positive or negative polarised) while also generating discussion about nuances.

Table 2: Survey questions range, average and standard deviation

	Min	Max	Mean	Std.D
daily life principles	3	7	6.34	.832
equal responsibility for solutions	1	7	6.21	1.064
historical responsibility	1	7	5.99	1.275
practical versus principle	1	7	3.83	1.759
needs versus wants	3	7	6.00	.962
biophysical limits matter	2	7	6.03	.982
control class consumption	2	7	5.42	1.433
Well-being versus income	3	7	5.98	1.017
legislate industry recycling	4	7	6.49	.686
market led growth matters	1	7	3.41	1.758
natures intrinsic value	2	7	6.20	1.007
biodiversity for development	4	7	6.21	.798
protect critical natural capital	2	7	6.39	.841
nature as ecosystem services	1	7	4.85	1.742
convert environment for development	1	7	3.54	1.482
local versus global economy	2	7	5.44	1.004
universal green trade	2	7	5.85	1.196
globally competitive local firms	1	7	3.90	1.469
offshoring ok for development	1	7	4.12	1.518
decentralized institutional authority	1	7	5.02	1.221
government levels coordinate	4	7	6.37	.594
national regulation of pollution	4	7	6.27	.657
global agreements effective	1	7	4.12	1.421
locally appropriate farming	1	7	3.55	1.598
balance technology and labour	2	7	5.03	1.242
another green revolution	1	7	4.45	1.643
encourage GM farming	1	7	4.00	1.713
voluntary industry control	1	7	3.30	1.939
EMS addressing source	1	7	6.06	1.103
ecologically sensitive planning	1	7	6.26	.893

coordinate government sectors	4	7	6.32	.710
wide range of policy tools	3	7	6.36	.678
mainstream impact assessment	3	7	6.28	.751
mainstream SD understanding replace laws	1	7	3.72	1.576
voluntary tools and commitments enough	1	7	5.01	1.486
bottom up community governance	2	7	4.89	1.147
equitable participation for decisions	2	7	5.73	1.188
open dialogue matters	3	7	6.20	.708
elected representatives enough	1	7	3.54	1.626

Qualitative Comments

A third qualitative component was added to the survey offering participants the opportunity to comment on their choices. Only one third to one quarter of respondents added qualitative caveats but where they did this information helped develop analysis.

Essentially suggestions about radical political, e.g. bottom-up governance, economic, e.g. privileging local farming and economies, or environmental change interventions in the survey provoked disagreement. Positions that were morally sound but had limited direct implications for individuals, e.g. support needs not wants, wide range of policy tools, open dialogue matters, were uncontentious and agreed to. Contentious issues pitting different strong and weak concepts, e.g. market-led growth, practice versus principle, citizens and representation, global competitiveness, convert environment for development (capital substitution), encourage GM farming, and voluntary industry control, etc., produced disagreement. There was scepticism about voluntary commitments in general, including global agreements (non-enforceable).

In what follows, I briefly illustrate some of the comments attached to specific questions to illustrate how such comments elaborated on, challenged or exemplified issues raised in questions.

- Q4: Practical development issues, e.g. job creation, should take precedence over principles and practices, e.g. gender equality or affirmative action, especially for poor economies or sectors of society.

  Practical issues should be addressed with principles of fairness and justice in mind to avoid perpetuating an unequal world. There is no conflict.

  With greater gender equality and affirmative action it allows increased participation and innovation within economies that will create jobs...there is an untapped reserve

  I could imagine situations where it is reasonable, but generally it is a very bad idea, because it does not promote sustainability.

  Education is probably the single most important stimulus for development across all sectors, and is a fundamental root of both economic growth and (arguably) gender equality. However, segregated attitudes to education will inhibit economic growth, so...

- Q10: The key to sustainable development globally is market-led growth, e.g. supply meeting demand in a free market.

  Markets play a central role in development, but need to be regulated to ensure equality and development goals are meet.

  Market-led gives rise to too many negative externalities and fails to address inequalities. It needs to be restrained by redistributive policies.

  The key to sustainable development is to reach social agreements made on the basis of rationality (science based evidence), but been aware that our decisions are taken only on the base of what we know, and there are many uncertainties. Therefore, flexibility to changing policy and management paths is …

  In part bridging the technology gap for Low Carbon and other renewables, and the growth can only be sustainable when growth is decoupled from carbon pathways or carbon intensity growth paradigms

- Q15: The conversion of the environment, e.g. land or forests converted to farming or housing, is an acceptable trade-off or substitution for development
  It can be, but it depends on how much land/forest is substituted, where (what kind of land/forest is lost), what is the quality/purpose of the development and who is it for.
  This needs to be regulated and strictly controlled. The recent governments decision to relax planning laws is uniformed and a fundamental mistake. Brownfield development needs to be moved up the agenda governments agenda (again).
  In future research these comments may be more fully analysed and also contribute to further development of test item content.

Discussion & Conclusion

Sustainable development is a multi-dimensional concept with broad ideological, ethical, political and economic consequences. The ladder of sustainable development integrates these factors into a framework that extends across eco-centric and anthropometric positions. Explicitly addressing this complexity should form part of HESD pedagogy, and there are some indications this is happening. Evaluating student knowledge before, during and after education should also address this complexity, especially at the postgraduate level.

This study trialled a survey with a cohort of UK postgraduate taught students, including a significant international student enrolment, to demonstrate the feasibility of such evaluation and initial results from its deployment. While the survey had limitations in development and deployment it indicated the feasibility of such evaluation and trends from this cohort. Results suggests that fewer questions could provide adequate content coverage and improve response rates and completion.

Prior survey studies of students have indicated limited knowledge of the broad multi-dimensional challenges of sustainable development. This study addressing a postgraduate cohort found students willing and able to take a position on a wider range of dimensions. Student respondents from a wide range of countries and backgrounds took an overall pragmatic attitude to moral versus practical issues, and showed a general resistance to strong interventions. There was broad consensus on the importance of principles, while anthropocentric development demands often won out over the environment. In sum there seemed to be limited support for strong positions on sustainable development.

Given the small cohort ((n=121) and the limited discipline and institution representation (n=10) it is not possible to generalize to the broader sector. However, based on the existing results and analysis there are indications of tendencies in this cohort that could be further tested. A repeat survey in other countries with a shortened version of test questions (n=30) would be potentially enlightening. Corrrelation of the survey with curriculum content and lecturer views would also be an interesting development.

Appendix: Survey Questions and Themes

Normative Principles

Q1: In all areas of daily life, e.g. work, school, etc. principles of (gender) equality, justice and equal participation, e.g. equal opportunity, should be observed and legally binding

Q4: Practical development issues, e.g. job creation, should take precedence over principles and practices, e.g. gender equality or affirmative action, especially for poor economies or sectors of society.

Q7: Patterns and levels of consumption between rich and poor sectors of society should be controlled, e.g. excessive manager salaries, higher income taxes, for more equitable outcomes in society, e.g. not only the rich have big houses, caviar and holiday.

Q8: Non-material aspects of development and well-being, e.g. health, social connection, happiness are more important than increasing income.

Q5: People's (basic) needs, e.g. water, shelter, not wants, e.g. new car, should guide global and national development policies and practices.

Historical Responsibilities

Q2: Both rich and developing nations are responsible for protecting the environment and taking steps to reduce carbon emissions and promote renewable energies.

Q3: Highly developed nations, e.g. USA, UK, Australia, have greater (historical) responsibility for the current global imbalance of wealth than developing and poorer countries.

Nature, environment and development

Q6: The biophysical limits of the environment, e.g. forest growth rates, fishing stock replenishment, coral reef temperature sensitivity, should dictate development and growth policy and practice.

Q11: Nature and the environment, e.g. lakes, landscapes, humpback whales, has its own intrinsic value that should not be sacrificed to human needs or wants.

Q12: Maintaining biodiversity, e.g. a rich balanced spread of fauna and flora species, has to be central to development.

Q13: There is a critical natural capital, e.g. global forest cover, whale populations, ozone layer, that must be protected and cannot be replaced or substituted, e.g. sun hats and sun cream for missing ozone layer, more housing construction for less forest cover.

Q14: Nature's reserves, e.g. water stocks, fish stocks, carbon stocks, are a resource pool, i.e. ecosystem services, for human development and growth

Q15: The conversion of the environment, e.g. land or forests converted to farming or housing, is an acceptable trade-off or substitution for development

Local and global focus

Q16: Local and regional self-sufficiency and economic development in villages and towns, e.g. employment, jobs and business, should be preferred to global competitivity.

Q18: Local firms and economies should be globally competitive and driven by global market demands for goods and services.

Q19: Offshoring manufacturing or service workforces from rich to less developed countries, e.g. factory production, outsourcing, and globalizing production is acceptable for development needs.

Market and industry controls

Q17: Green and Fair Trade practices, e.g. Fair Trade Coffee, Clothing, should be a universal standard and norm for retail, production and consumption.

Q28: The relevant industry and firms, e.g. pharmaceutical companies, energy companies should be able to voluntarily manage and control their environmental obligations and pollution controls, e.g. water pollution.

Q29: Environmental policy and management measures for firms and industries should address the source of pollution, e.g. use of chemicals, not the final output, e.g. polluted rivers.

Q10: The key to sustainable development globally is market-led growth, e.g. supply meeting demand in a free market.

Policy and legislation

Q22: National or state bodies (not just community, market tools, e.g. carbon taxes, or voluntary actions) should regulate environmental management and pollution controls and development policies, e.g. national laws and penalties.

Q23: Global measures for development and climate change agreements, e.g. Kyoto Protocols, Millennium Development goals, have been effective

Q32: There should be a wide range of policy tools, e.g. environment protection laws, building and construction laws, to enable sustainable development

Q31: Government should jointly coordinate different policy areas, e.g. urban planning, water supply management, employment, according to overarching sustainable development principles, e.g. small footprint, balance of local and state or national concerns.

Q30: Ecologically sensitive planning and design in towns and cities, e.g. green spaces, low-density housing, small footprint construction, should be the norm

Government-Society relations

Q20: Political, e.g. government, economic, e.g. banks, and other institutions, e.g. schools, should have significant decentralised autonomy for making legal, economic and social decisions for their communities

Q21: National, state and district levels of governance need to have better coordinated and more balanced partnerships for decision making about development.

Q36: Bottom up local government and community structures and decisions provide the best guidance for national and state government regarding sustainable development

Q37: Local and national government should ensure equitable participation for decision making about growth and development across gender, ethnicity, including through quotas e.g. female, ethnic quotas and policies

Q38: Open dialogue with government through multiple channels, e.g. social media, forums, etc., about current and future growth and development is important for good Civil Society-State relations and outcomes

Q39: Elected representatives can negotiate with representatives of economic and other interests, e.g. business leaders, without significant civic participation

Technology and rural development

Q24: Farming and agriculture should return to more locally appropriate, labour-intensive forms of agriculture, e.g. planting and milking by hand, rather than just technically more efficient mechanisms, e.g. high yield seeds, tractors

Q25: A balance of labour-intensive and technology-driven farming and agriculture, e.g. tractors, according to local conditions, e.g. employment rates, local economy needs, is the best global solution to development

Q26: Another Green Revolution, e.g. significant increases in crop production, through technological innovation is needed to meet rising global food production needs.

Q27: Experiments with genetically enhanced and pest resistant plants should be encouraged to meet future food production needs.

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