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Working Group Session for Capacity-Building in Econometric Modelling  
Project: Review of the Economics of Climate Change in the Caribbean  
Port of Spain, 18 February 2011

**REPORT OF THE WORKING GROUP SESSION FOR  
CAPACITY-BUILDING IN ECONOMETRIC MODELLING:  
A REVIEW OF THE ECONOMICS OF CLIMATE CHANGE  
IN THE CARIBBEAN**

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## **A. DECISIONS AND RECOMMENDATIONS**

The following decisions and recommendations were adopted:

1. Although there was some discussion on adopting the A2 scenario of the Intergovernmental Panel on Climate Change (IPCC) as the Business as Usual (BAU) scenario for forecasting of probable impacts, it was later decided that this would not be appropriate and the original BAU, A2 and B2 scenarios would hold.
2. Results should be presented on a decadal basis since this will be more useful for planning purposes.
3. ECLAC will circulate the draft agenda for the in-country workshops electronically for comment.
4. The next meeting of the High Level Advisory Committee (HLAC): Review of the Economics of Climate Change in the Caribbean will be held on 14-15 April 2011.

## **B. ATTENDANCE AND ORGANIZATION OF WORK**

### **Place and date**

The workshop was convened by the Economic Commission for Latin America (ECLAC) Subregional Headquarters for the Caribbean on 18 February 2011 in Port of Spain.

### **Attendance**

The workshop was attended by the consultants and their resource persons, members of the review team, and ECLAC representatives. The complete list of participants is attached in Annex I.

### **Agenda**

- Opening remarks
- Working group session
- Presentation and discussion of key findings of each group
- Presentation and discussion of the proposed agenda and schedule for the in-country workshops.
- Finalization of agenda and schedule for in-country workshops
- Final comments and closure

### **Process**

Participants were organized into groups by sector (Annex II). Within these groups, consultants, together with at least one reviewer, engaged in discussion. A report was then presented to the plenary on the key issues discussed by the group and decisions reached. Lastly, there was brief discussion about the in-country workshops.

## **C. SUMMARY OF PROCEEDINGS**

### **Welcome and opening remarks**

Ms. Charmaine Gomes, Sustainable Development Officer, ECLAC Subregional Headquarters for the Caribbean, welcomed participants to the meeting and to Trinidad and Tobago. She suggested that the informal workshop would be useful in light of the fact that all consultants had submitted at least one draft report and, as such, discussions on issues being faced with respect to data collection, modelling and strategies for adaptation and mitigation could be discussed in some depth. She urged the consultants to use the workshop as an opportunity to collaborate on issues on a sectoral basis and to take advantage of the presence of the reviewers to discuss any substantive issues, if necessary.

Mr. Mark Bynoe, Environmental/Resource Economist, Caribbean Community Climate Change Centre (CCCCC), commented on some key issues that arose across many of the reports highlighted by the team of reviewers and shared some key decisions that had been taken since the last High Level Advisory Committee (HLAC) meeting:

- (a) A discussion of the use of the A2 scenario as the Business as Usual (BAU) was entertained but was later rejected in favour of the original scenarios.
- (b) Consultants were reminded that assumptions should be clearly stated and technical concepts should be defined, including the emissions scenarios that were being used, to help policymakers and others grasp the information being presented.
- (c) Consultants were reminded that the discount rates to be used were 1%, 2% and 4%. If there was need for a different discount rate to be applied, then that should be explained and streamlined by sector.
- (d) Consultants were reminded that the baseline year should be 2008 and all projections should be made to 2050. Justification should be made for periods beyond 2050.
- (e) Projections to 2050 may be presented using decadal or annual presentations, but consultants should bear in mind that the objective was to give policymakers a way to include the issues being discussed in their development planning frameworks.
- (f) Consultants were reminded to contextualize their reports. Studies should be couched within national (and regional) contexts since factors such as GDP growth, poverty, progress towards the Millennium Development Goals would impact the options available to the policymaker and should be considered in discussing adaptation and mitigation options.
- (g) In general, the cost-benefit analyses lacked clarity in terms of how benefit streams were arrived at and how the reports progressed from the modelling results to the presentation of adaptation strategies and, then, costing of the adaptation and mitigation options. The studies should clearly describe the progression from one phase to the other.

### **General discussion**

Mr. Dillon Alleyne, Economic Affairs Officer, ECLAC, suggested that confidence interval bands could be included in reporting findings and presentation of forecasts when dealing with uncertainty in the econometric models. Mr. Dominic Moran, Consultant, suggested that in each sector there should be agreement on what the uncertainties were and the mechanisms for treating them.

Ms. Charmaine Gomes, Sustainable Development Officer, ECLAC, stated that some countries had prepared national communication reports to the United Nations Framework Convention on Climate Change (UNFCCC). These reports highlighted the countries' priorities and stated what they had done, thus far, in treating with climate change and, in some cases, they had budgeted for some activities. Ms.

Elizabeth Emmanuel, Consultant, offered to share Jamaica's second national communication to UNFCCC via e-mail.

Mr. Michael Witter, Consultant, suggested that there should be a common Glossary of Terms, which could be used across all the studies for consistency. Mr. Dominic Moran, Consultant, suggested that for most concepts the definitions could probably be found online and then modified. The Sustainable Development Officer asked the consultant who initially proposed the idea to lead the compilation of the glossary and suggested that some Caribbean specific terms that might require explanation be included. The consultant agreed that consultants should define technical terms specific to their sectors and submit these to him.

Some confusion emerged as to how to represent the fact that A2 was now BAU in the reports. Some consultants wondered whether they were now required to say A2 to mean BAU or if the terminology would be misleading. Another suggestion was to use the term "baseline" instead of "BAU". There was also some disagreement among consultants and review members of how the BAU was being conceptualized and constructed. It was initially agreed that the A2 would replace the BAU and that consultants would explain the issue in their reports. However, this was later adjusted in favour of the original conceptualization of the BAU and the use of the A2 and B2 scenarios for forecasting.

### **Plenary session - Reports of group discussions**

#### **The Economic Impacts of Climate Change on the Tourism Sector**

The presenter for the tourism sector reported that the group had elected to use the comments received from the Department for International Development (DFID) as a guide to their discussion. First, there was concern among consultants that the comments received from the reviewers conflicted at times, leading to confusion, and some comments gave the impression that reviewers may have been unaware of the consultants' terms of reference.

With respect to the structure of the final reports, it was agreed that all reports should have an executive summary that contain conclusions including key impacts and overall cost estimates; attempts should be made to keep the country context and analysis of the sector brief and focused; and the results should be clearly elaborate and should specify time frames (e.g. 2030, 2050, etc.). Detailed results related to the econometric models may best be placed in an Annex, but should be maintained as part of the reports in order to maintain technical integrity. It was also suggested that ECLAC should advise how much technical detail should be placed within the document since there were different audiences, for example, policymakers and researchers.

It was suggested that ECLAC should provide clear definitions of BAU, A2 and B2 to all consultants for consistency. In turn, these should be made explicit in the reports so that the reader, without prior knowledge of these emissions scenarios, could follow.

It was also suggested that there should be agreement and consistency across all reports in all sectors with respect to the treatment of extreme weather events (el Niño and la Niña) and a harmonized approach to treating with assumptions that were not sector specific.

It was agreed that, where possible, it would be useful to include visual representations of geographical distribution of risks, such as maps highlighting areas frequented by tourists or where tourism assets might be located. It was further suggested that the website <https://www.cresis.ku.edu/> was a good reference resource to all consultants.

With respect to model specification, the consultants agreed that in some cases proxies would have to be used for some variables, but assumptions and data limitations should be clearly stated and, where necessary, explained.

It was agreed that due to the importance of the tourism sector to Aruba, Barbados, Curaçao, Jamaica, Montserrat, St. Lucia and the Bahamas, some discussion and analysis on leakages/multipliers was necessary and this would be included in the revised reports. Additionally, stronger linkages were needed between results/findings and recommendations. The latter should be specific and contextualized to the adaptation options presented; they should not be too general.

### The Economic Impacts of Climate Change on the Agriculture Sector

The presenter for the agriculture sector raised several issues that were discussed, noting that there was need to consider what other sectors were doing and what their findings might be since adaptation strategies for that sector might be aligned with other sectors, such as water and energy.

Careful consideration of methodology and analysis of results were needed. Some consultants had found that models contradicted information and experience on the ground. Additionally, some consultants found that their results were counterintuitive. The importance of consulting with agronomists on the ground and using a common sense approach were discussed as being equally important since the models were only as good as the assumptions made in constructing them.

Some subsectors which were not being modeled, as the studies were necessarily delimited to food production and fisheries, might be important to adaptation and mitigation strategies. For example, forestry was not a huge contributor to GDP but was important for carbon-storage and watershed management. It was agreed that consultants would, where necessary, include a discussion of important issues that were not being modelled but which had important implications for the sector, including for relevant mitigation and adaptation strategies.

Consultants were reminded to take into account adaptation strategies already taking place on the ground, and to carefully align adaptation priorities emerging from the studies with those elaborated in country/national policy papers.

A concern was raised on the method of inclusion of mitigation options in the cost-benefit analysis. It was confirmed by the Environmental/Resource Economist that the Caribbean, as a region, was primarily concerned with adaptation notwithstanding mitigation. It was agreed that for the cost-benefit analysis there might be some assumptions that needed to be aligned across sectors in order to take into account cross impacts. A good example was the impact of water resources on agriculture.

In terms of fisheries, it would be necessary to calculate approximate impacts using data from a global study. It was also suggested that it might be useful to have some discussions with the consultants working on studies that considered the climate change impacts on the coastal and marine sector. It was suggested that the Food and Agriculture Organization (FAO) State of the World Food Report might be an important resource for consultants doing research in that sector.

The consultant working in Guyana was experiencing severe data collection problems and several opportunities to close data gaps were discussed. Additionally, in all countries data on soil loss, loss of fisheries and monetary loss due to disasters were generally unavailable. A concern was expressed that exogenous variables were being excluded from the econometric models, which could explain why the econometric models were not performing well.

It was suggested that projections and impacts should be cumulated and presented in 10-year periods (2020-2030, 2030-2040) and it was agreed that 2008 should be used as the base year and the discount rates should be 1%, 2% and 4%. There was a discussion as to the “rules” for constructing A2 and B2 scenarios without a “no-climate change scenario”. Consultants were advised that they should use the trend of the variable under consideration up to 2008 and then project using A2 and B2 scenario.

### Discussion

Mr. Mark Bynoe, Environmental/Resource Economist, presented the “rules” for constructing the A2 and B2 scenarios that had been discussed within the group. Consultants were advised that they should use the trend of the variable under consideration up to 2008 and then project using A2 and B2 scenarios. A discussion followed among consultants and reviewers regarding the methodology presented. Several questions were raised, regarding inter alia, the “baseline”, replacement of BAU with A2, and the concept of “a no-climate change scenario”. However, it was later clarified that the three scenarios were indeed the BAU, A2 and B2.

### The Economic Impacts of Climate Change on the Water Sector

The countries being studied were Saint Vincent and the Grenadines, Grenada and Turks and Caicos Islands. In general, there was a problem with data availability for the sector and consultants were experiencing some challenges with the econometric modelling.

There was a lack of water data for Saint Vincent and the Grenadines and Grenada, where data were only available for three years and in the Turks and Caicos Islands data were only available for the period 1998-2008 with some projections to 2026. Possible solutions were discussed including collaborating with other consultants and referring to previous studies in the region to fill data gaps. A recent regional water study had been conducted (Hutchinson) but there were data challenges in that study as well. The solution used by that study was to apply the water usage for Trinidad and Tobago for all other countries being studied, assuming that there would be similar usage across countries. One possible solution was to use data from similar countries; another suggestion was to think of another country that was similar and use their data. That approach would be based on the key characteristic of selecting a country with similar economic issues, consumption patterns and size.

Several issues still existed with respect to the econometric modelling to project water demand and the impact of climate change on the sector. Several modelling options were discussed and clarifications were sought on the suitability of some models over others. It was agreed that water expenditure would be defined as water usage multiplied by sector specific water rates, if available. It was confirmed that in the case of the Turks and Caicos Islands, only a water demand model was needed since desalination implied that the Turks and Caicos Islands was unlikely to experience water supply constraints. The modelling for Grenada and Saint Vincent and the Grenadines was still at a very initial stage. Issues encountered in the calculation of tourism-related water demand were discussed including the relevance of using tourism expenditure as the dependent variable; possible methods to estimate water demand from land-based tourism using the number of hotel rooms as an indicator; and the challenge of accounting for the water demand of cruise tourism. There was a concern about how to project GDP data to 2050 in the scenario forecasting.

Although consultants were not yet at the stage of costing adaptation options, several useful resources for that stage of the study were discussed. It was suggested that some information could be sourced from World Bank websites, the United States Agency for International Development document “Adapting to Climate Variability: a Manual for Development Planning”. Another good reference point was Winston Moore’s draft tourism report.

## Discussion

It was suggested that using another country might not be the best decision because there were so many different issues to consider. A good proxy for the residential sector was to use water use per household and assume that persons had similar consumption patterns across the Caribbean. Calculating water consumption in other sectors remains a challenge. In terms of tourism there would be a need to consider, for example, how many rooms and golf courses existed. Those would then possibly be scaled up or down accordingly to account for the water usage.

In terms of projecting GDP data, one approach was to use 2008 GDP or GDP per capita and projecting forward, keeping GDP constant.

### The Economic Impacts of Climate Change on the Energy Sector

The presenter noted that the consultant had experienced significant challenges in sourcing data for the study and was currently at the stage where he had received commitment from stakeholders to provide the requested data, including sectoral data and monthly data, in the shortest possible time.

The consultant was also at the early stages of building an econometric model, which could be used to project climate change impacts on demand and supply of energy. In particular, the main issues being faced by the consultant were finding a suitable functional form and deciding on the variables that should be included, for example, including a way to treat with technical change and lowering the constraint of fixed oil reserves. It was also noted that in terms of treating with externalities, regional countries' attitudes towards externalities would impact on industry performance. Additionally, the reaction of some countries to those externalities would also play a part.

In terms of adaptation options, the consultant planned to include a discussion of cost/benefit of adaptation options, cost of the energy sector adapting to the impact of climate change, and benefits of the adaptation options in his next draft.

### The Economic Impacts of Climate Change on the Health Sector

The presenter for the health sector reported that the challenges being faced by the consultants could be grouped under four headings corresponding to the progressive phases of the studies. First, there were issues related to the econometric modelling and forecasting of disease incidence; secondly, problems associated with valuation of the historical/current disease burden related to the diseases under study; thirdly, problems related to identifying adaption options; and, lastly, issues related to determining a credible cost for the adaptation strategies being proposed.

In general, consultants were currently working on revising their first drafts and were occupied with improving the performance of their models.

In terms of modelling disease incidence, data availability proved to be a major challenge in some countries, resulting in cases where monthly data were not available and thus consultants had to work with annual data. That was a less than ideal situation since seasonality could not be taken into account, and the consultants had been forced to limit the focus of their studies to those diseases and explanatory variables for which data were available.

The costing of the current and projected disease burden could be conceptualized in terms of morbidity and mortality, each presenting unique challenges to the researcher. It was agreed that a



treatment-cost approach would be used to cost the disease burden due to morbidity and that mortality could be valued using either a Value of Statistical Life (VOSL) approach or by simply reporting a count of deaths avoided. It was agreed that if the VOSL approach was adopted, an internationally accepted “value” would be used without “discounting” on the basis of level of development of one country (GDP per capita).

Adaptation options could be conceptualized broadly based on the degree of uncertainty and levels of cost under consideration. Some strategies were “no-regret” options, while others might require more scientific “decision-making” methods to justify the costs involved. It was agreed that the adaptation strategies would be presented under the themes of policy design, infrastructure and behavior change. Methods of costing the adaptation strategies were currently being explored by consultants.

### The Economic Impacts of Climate Change on the Coastal and Marine and Coastal and Human Settlements

In terms of the structure of the reports, consultants were reminded that the fluidity of the report, introductions and context were important. They were encouraged to carefully define the sector and its relevance to the country being studied. Consultants were also reminded that they should be aware of map scales as larger scales might have different results, and ensure that the scale used is defended. It was also suggested that the methodological aspects of the study are very important and it was necessary to be explicit about the use value including the methods used to estimate these and to clearly state assumptions and challenges (including challenges with data and limitations of the study). Consultants were also reminded of the need to work together, contact each other freely, and to share results between each other.

There was some discussion about the differences between Guyana and Barbados. Barbados is a tourism destination and, therefore, the risk was quite high (increase in sea level rise meant risk to beaches). In Guyana, the alternative was relocation, whereas Barbados did not have that option. In Guyana, it might be possible to construct/enhance the seawall or relocate the vulnerable populations and the advantages and disadvantages of those two options could be compared.

Consultants were experiencing some challenges with converting temperature and rainfall into a change in the return period for extreme weather events.

There was some concern expressed about double counting (fisheries, biodiversity), but the consultants defended the view that double counting was not so severe because the fisheries value was determined by use value while biodiversity was non-use value.

Challenges cited included natural resource valuation, including estimates for those coastal zone attributes, and valuing ecosystem services. In terms of cost benefit analysis, one option discussed was to consider strengthening the seawall versus relocation of coastal communities.

One consultant articulated a need to clarify the methodology better, such as assumptions used and which use values were being employed. In the results section, there was need to make the tables and diagrams more presentable and easy to read and include ranges. The cost benefit analysis needed to focus on an assessment of the adaptation strategies; make recommendations which should be verified with the particular country; mention mitigation, although not belabour it. Energy efficiency was highlighted as being very important to mitigation.

Consultants were advised that they should not focus on what data they did not have, but should use appropriate proxies where possible. In the development of the models, it was agreed that assumptions

would be clearly outlined, and the World Resources Institute model would be used for valuing coastal resources.

In terms of adaptation and mitigation options, it was agreed that adaptation options should be taken from the national assessment reports and country inputs while mitigation can focus more on energy efficiency.

#### **D. IN-COUNTRY CAPACITY-BUILDING TRAINING WORKSHOPS**

The Sustainable Development Officer at ECLAC discussed the Capacity-Building Training Workshops which were scheduled to be conducted in the countries being studied during the period March to April. Due to time constraints, it was decided that ECLAC should circulate the draft agenda for the workshops electronically for comment. A copy of the draft that was presented for discussion is attached as Annex III.

Michael Witter, consultant, suggested that ECLAC should include some parameters such as objectives and target audience when circulating the draft so that there would be some basis for commenting on the draft.

The following were noted with respect to the workshops:

- **Timeline:** The workshops would be hosted during the month of May rather than March –April since potential participants would be engaged in other international climate change-related events during that time.
- **Audience:** Some of the consultants inquired as to the intended audience/ beneficiaries of the in-country workshops. Elizabeth Emmanuel, consultant, suggested that, in some cases, persons in other sectors were likely to benefit from discussions. For example, the same technicians were likely to benefit from discussions on climate change impact on health, tourism and agriculture in Jamaica. The Sustainable Development Officer at ECLAC confirmed that Guyana had, in fact, suggested that all the consultants should go to the country at the same time and deliver the workshop to the same audience over two days. Consultant David Moran, suggested that graduate students should be included among the beneficiaries of such training as they would be the next generation of policymakers and technicians.
- **Planning:** ECLAC would organize the workshops on behalf of the consultants, together with the focal point in the respective country.
- **Purpose:** The objective of the workshop would be to build in-country capacity in econometric modelling of the impacts of climate change on specific sectors of each country.

#### **E. RECOMMENDATIONS, CONCLUSIONS AND CLOSING REMARKS**

It was suggested that ECLAC should:

- (a) Prepare a policy brief based on reports;
- (b) Ensure same definition of BAU, A2 and B2 at the earliest opportunity;
- (c) Determine where detailed results should be placed within the report or in an annex;
- (d) Advise on a harmonized approach to treat with extreme events and assumptions that were not country or sector specific in an effort to achieve consistency across all reports.

The workshop was concluded following the reiteration of key action points:

- (a) Issues with data availability, consistency and limitations should be clearly stated in reports and proxies should be used where data for specific variables were not available.
- (b) The agreed discounting rates would be 1%, 2% and 4%.
- (c) Following much discussion during and after the workshop, the scenarios to be used were the BAU as the baseline trend up to 2008 and the A2 and B2 for forecasting the impacts to 2050.
- (d) Clarification was sought as to how to treat with costing the long list of possible adaptation strategies and it was agreed that the “most important”/ “priority” ones should be costed.
- (e) Useful resource for consultants and review team: Economics of climate change in Central America summary 2010 – available online (LC/Mex/L.978.)

## **F. FEEDBACK ON WORKSHOP**

Workshop participants were asked to complete an evaluation form of the workshop thereby providing participants with the opportunity to submit comments to ECLAC. In general, the workshop was well received by both consultants and reviewers. All groups found that the workshop provided good opportunities for discussion and helped to provide clarification, possible solutions and useful resources. A detailed analysis of the feedback is attached as Annex IV.

## Annex I

### **List of participants**

#### **Consultants**

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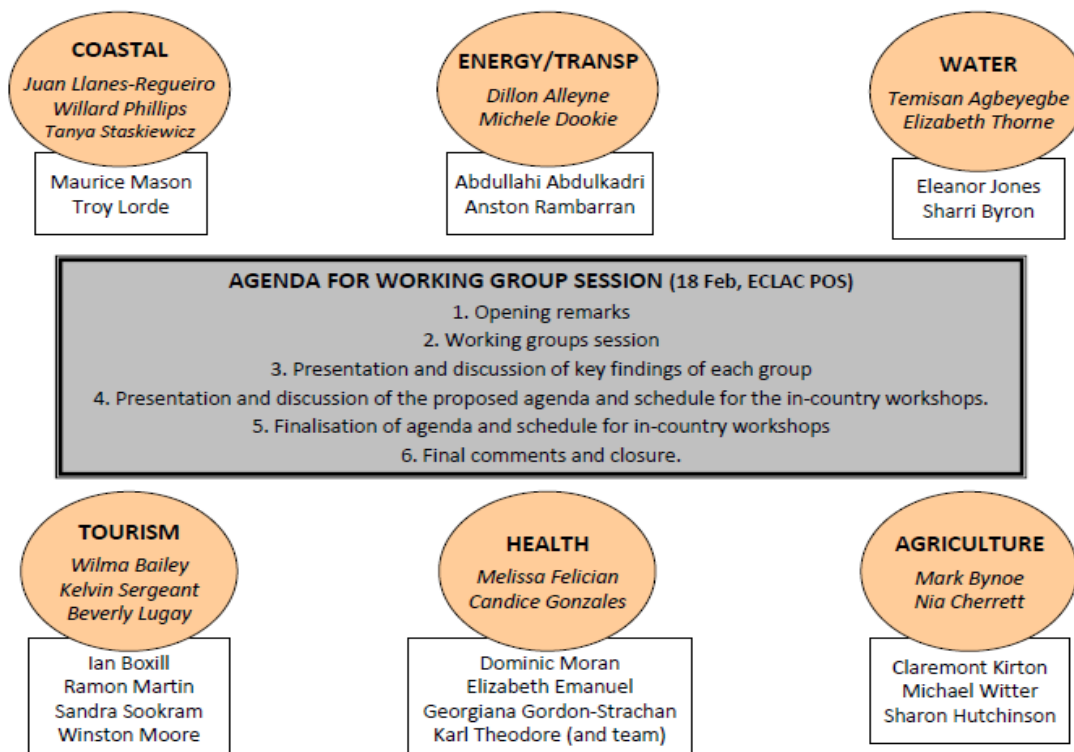
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## Annex II

### Agenda and groups



### Annex III

#### **Draft agenda for in-country workshops**

##### **DAY 1**

Introduction (climate change and the sector)

- Aspects of climate change (including scenarios etc.)
- Climate change and tourism
- Issues involved in costing climate change
- Methodologies for analysing climate change in the tourism sector
- 
- Modelling Climate Change and Tourism Demand and Supply
- Climate aspects (how they impact the sector)
- Temperature
- Precipitation
- Extreme events
- Sea level rise
- Coral reef loss
- (more could be added here according to sector being studied)
- Demand aspects
- Selection of variables that impact tourism demand
- Supply aspects
- Selection of variables that impact tourism supply
- Choosing an econometric model
- Aggregation of Cost

##### **DAY 2**

- Forecasting climate change under A2 and B2 scenarios
- Discount rates
- Adaptation and mitigation options
- Net benefit cost analysis
- Country specific adaptation and mitigations strategies

Note: There may be some spill-over from Day 1, but that can be worked out in a formal agenda.

## Annex IV

### **Feedback from consultants and reviewers**

#### **Consultants – feedback received from 15 consultants**

1. Do you think the workshop provided a forum for open discussion?
  - 14 of the 15 consultants said “yes” the workshop did provide a forum for open discussion. One consultant disagreed, but declined to give a reason.
2. Concerns and challenges met?
  - Most consultants (9) said “yes”, but many (4 out of 15) said “somewhat” and 2 consultants felt that their concerns were not met.
3. Suggestions?
  - The reviewer could have given some guidelines for the exercise which would have given more structure to the discussion
  - The reviewer should have had a sense of what was in all of the papers
  - Better preparation by reviewers and participants
  - Sharing of information from other similar studies earlier on in the research process eg the Central American Study
  - More timely submission of reviewers’ comments
4. Other Comments
  - Very good forum for discussion among consultants at this stage in the report writing.
  - Very good idea to have the workshop; it helped considerably with respect to the approach and data sources
  - As a group we covered a lot of issues that have been troubling me with the analysis, the workshop brought to bear the fact that others are also facing similar issues and we were able to discuss these and reach some conclusions for our reports. One conclusion is that we are not (and cannot) strive for perfect final report and identical approaches at this stage.

#### **Reviewers – feedback received from eight reviewers**

1. Do you think the workshop provided a forum for open discussion?
  - All reviewers said yes - the workshop did provide a forum for open discussion
2. Concerns and challenges met?
  - Most reviewers (6) said yes, but two of the eight reviewers said that concerns and challenges were only “somewhat” met.
3. Suggestions?
  - Interaction and discussion with other consultants/sectors earlier in the day would have been useful
  - Consultants should be invited to present the major findings of their work also
  - We came further but personal contact between consultants and reviewers is needed next