Climate Investment Funds

PPCR/SC.6/9
June 9, 2010

Meeting of the PPCR Sub-Committee
Washington, D.C.
June 23, 2010

PROPOSAL FOR THE ALLOCATION OF RESOURCES TO PPCR PILOTS

Proposed Decision by PPCR Sub-Committee

The PPCR Sub-Committee reviewed document PPCR/SC.6/9, *Proposal for the Allocation of Resources to PPCR Pilots*, agrees that the following principles should guide the allocation of resources under the PPCR:

Introduction

1. The PPCR countries are rapidly approaching the stage when Strategic Programs for Climate Resilience (SPCRs) are being prepared and firm guidelines on the funds available are needed.

2. The advice given to pilot countries in paragraphs 49 and 50 of the Programming Document (Box 1) was that "*Based on current pledges, the average funds available per pilot program range from $US 30-60 million, with approximately half the funds available for grant financing and the other half available as highly concessional loans*." The Programming Documents also mentions that countries with greater potential to contribute to the goals of the PPCR may "*have enhanced opportunities for accessing resources" and that access to the funds should be "principally needs based*". The Programming Document anticipates a staggered entry of applications and potential over subscription of the funds available and further suggests that "*each pilot should be able to access at least 5% and up to a maximum of 10 % of the total grant amount available in the PPCR.*" At the time the Programming Document was prepared this translated to $US 12-25 million of grant funding, but now would be close to $30-60 million in grant assuming there are no additional pilot countries. A cap of 20% per country (currently about $US60 million) for the concessional loans was also suggested. ***This document does not discuss the application of the concessional loan resources any further.***

Box 1 Relevant paragraphs from the Programming Document

Determination of financing for pilot programs [^] (Phases 1 and 2):

49. Based on current pledges, the average funds available per pilot program range from $US 30-60 million, with approximately half the funds available for grant financing and the other half available as highly concessional loans. In considering the financing of each pilot, the PPCR-SC should take into consideration the needs of the country or countries as presented in the Strategic Program for Climate Resilience and the proposed program of activities. This will allow countries proposing activities with a greater potential for a transformational shift of approaches and scaled-up action, innovation, and/or co-finance to have enhanced opportunities for accessing resources.

[1] Both single country and regional pilots

Methodology

50. *Grant amount:* A grant financing envelope will be agreed by the PPCR-SC on the basis of the *Strategic Program for Climate Resilience*. While principally needs based, each pilot should be able to access at least 5% and up to a maximum of 10 % of the total grant amount available in the PPCR (a range of between 12 – 25 million based on the current number of 11 pilots and the current pledged grant amount). This should ensure that adequate resources are available for pilot programs independent of time of submission.

3. Given that there has been a significant increase in the resources available to the PPCR, the PPCR-SC may wish to consider additional or modified advice on resource allocation. These include whether:

a) the guidance on the allocation should be refined further to reflect differences in needs and capacity among the pilot countries and regions;
b) the allocation to a regional program should be the same or larger than for a pilot country; and whether
c) new pilot countries should be incorporated.

4. This paper discusses options that the PPCR-SC may wish to consider in relation to the above advice. It reassesses the original advice in terms of the increased resources available; discusses principles and options for allocating resources based on needs and capacity; and reviews the implications of including additional countries.

Refining the Allocation[1] Advice

A. Advice similar to that provided in the Programming Document

5. With current funding the original advice in the Programming Document would translate to a range of $30-$60 million (i.e. 5% to 10%) of grant per pilot country and region. If there is no increase in the number of pilots or funds available this could lead to a small over-run in requests ($660 million in requests) if all pilots request close to the $60 million upper cap.

6. The PPCR-SC may also wish to give further guidance to the regional pilots with respect of allocation to the regional component and to countries within the regional pilot. While the principle has been that each regional program would count as one pilot, experience gained through joint missions indicates that the needs of the region are larger than what would be available through a common limit to funding for all pilots. Table 1 shows the effect of modifying and possibly differentiating the upper percentage allocation for pilot countries and regions.

Table 1: Examples of allocations based on equal shares for pilot countries and possibly an enhanced cap for regional pilots

Upper cap based on $600 million grant financing 9 pilot countries and 2 regions				
A.	B.	C.	D.	E.
% for Countries	**% for Regions**	**Rounded Cap for Counties** (in $million)	**Rounded Cap for Regions** (in $million)	**Maximum request**
10	10	60	60	660
9	9	55	55	605
8	12	50	75	600
7.5	15	45	90	585

[1] Here the phase "allocation" refers to guidance to a pilot country or region on the likely upper cap on resources available; it does not imply an entitlement to those resources.

7. The advice in the Programming Document could be updated as follows (with the [bracketed] text using numbers from A, B, C & D in Table 1):

> *50. Grant amount:* A grant financing envelope will be agreed by the PPCR-SC on the basis of the Strategic Program for Climate Resilience. While principally needs based, each pilot should be able to access at least 5% and up to a maximum of [8]% for pilot countries and [12]% for pilot regions of the total grant amount pledged in the PPCR as of July 1, 2010 (a range of between 30 – [50] million USD for individual pilot countries and 30 – [75] million USD for regions based on the current number of 9 pilots and 2 regions and the current pledged grant amount.

8. The ultimate basis of the actual allocation for each pilot remains the quality of the proposed investments in SPCR and their relevance to the goals and objectives of the PPCR.

B. "Needs-based" Allocation

9. Three options for guidance for the PPCR-SC are reviewed in the Annexes. They are

a) guidance based on other relevant funds;
b) other relevant allocation and cost estimation procedures, and
c) guidance based on the rapidly increasing quantity of technical work on indices of vulnerability, capacity and needs assessments.

10. In Annex 1 it is concluded that there is little direct guidance on needs-based allocation to be derived from existing and relevant funds. None have an explicit allocation rule for adaptation although there are useful ideas that might be taken up in developing rules for the PPCR.

11. While there has been much discussion in the technical literature about the concept of vulnerability and indices for assessing vulnerability, coping/adaptive capacity, etc, there have been few thoroughly worked examples. Also, vulnerability indices usually have been designed to better understand the drivers of vulnerability or to compare countries, regions, and communities in terms of the risks they face from climate change and their capacity to deal with them. This is not necessarily the same as designing an allocation index or rule to be used to allocate limited resources equitably, transparently and efficiently among countries (or other groups).

12. For allocation it would be expected that vulnerability and coping/adaptive capacity would remain a core consideration, but so also might the needs of the country in terms of its size and population (i.e. what is needed to make a difference) and its capacity to absorb funding. The goal of the CIF is to pilot transformative change in actions to respond to climate change.

13. Even without a detailed analysis it is clear that developing a single composite index will lead to some difficult issues. For example, across all the pilot countries Bangladesh has half the total population, three-fourths of the people affected by climate related disasters in the past 30 years, and receives half of the IDA allocation of the group of pilots. Bolivia and Niger contribute almost half the land area, while Tonga contributes only a tiny fraction of a percent of

the land area, but almost all of that is vulnerable to storm surges and seal-level rise. Pilot countries differ by factors of 1000 or more in some important comparisons. It is difficult to balance these different circumstances in a quantitative index. For an effective allocation within the pilot, a quantitative index would need to be subject to caps and minimum allocations.

14. Another approach that takes the same information into account, but avoids using quantitative indices, is to cluster countries in a small number of groups based on relevant indicators but only by broad categories (e.g. high, middle, low population) and not on quantitative metrics. The groups could then each be allocated appropriate caps.

15. Some consistent results emerge from a range of such analyses. Three countries, Bangladesh, Mozambique and Niger, consistently appear among the top few rankings. The ranking of the other countries and regions are much more variable. In the regions, the Caribbean usually ranks higher than the Pacific largely due to the influence of Haitian statistics.

16. This suggests a process similar to that adopted by the Expert Group in their process of country selection; i.e. to be guided by quantitative and categorical indicators but to eventually use expert judgment to make the final allocations. These might be in the form of a basic allocation for most countries which is increased for those recognized as having special needs due to exposure, vulnerability, population/size and capacity. Operational considerations would suggest minimum caps for all countries (main pilot countries and countries within regions) for efficiency and transformation effectiveness.

17. A simple allocation tool is provided in Annex 2 (and attached spreadsheet) to explore the outcomes of different allocation rules. The tool allows a user to vary, among others, the maximum and minimum caps on allocations and equal or different 'quotas' based on assessed needs. An example outcome is shown below for illustrative purposes. The "Alloc Quota" shows the expert assigned relative allocations for each country and region and the next two columns the amount allocated under the rules represented in the right hand block of variables rounded to the nearest $million and to the nearest $5 million. The PPCR-SC may wish to explore additional options.

	Alloc Quota	Allocation $ million	Rounded $ million
Bangladesh	1.5	65	65
Bolivia	1.0	43	45
Cambodia	1.0	43	45
Mozambique	1.5	65	65
Nepal	1.0	43	45
Niger	1.5	65	65
Tajikistan	1.0	43	45
Yemen	1.0	43	45
Zambia	1.0	43	45
Caribbean	2.0	86	85
Pacific	1.5	65	65
Totals	**14.0**	**602**	**615**

Variables	$ Million
Min Alloc Pilot Country	30
Min Alloc Regional country	10
Max cap - all countries or regions	100
Rounding	5
Amount to be allocated	600
Rate	43

C. *Expanding the Number of Pilot Countries / regions*

18. Given that the resources available to the PPCR have increased significantly since the country selection process there may be an expectation that the number of pilots could be increased. The MDBs and partners have made a strong point that the funds available now are not regarded as sufficient to be transformational in some pilot countries and that adding additional countries at this stage would dilute the potential of PPCR to have transformational impact. However, if the resources available were to increase substantially over resources currently pledged the selection of additional pilot countries could be reconsidered building upon experience gained with the initial group. If the PPCR-SC wishes to consider increasing the number of pilot countries the next paragraph considers whether the advice received from the Expert Group (EG) can be used to guide country selection.

19. The EG decided to make their recommendations for pilot country selection on a regional basis so there is no single list of priority countries from their considerations. Within each region there are several countries that did not make the final list but which the EG assessed as being appropriate for support. Thus, the PPCR-SC could seek guidance from the original EG reports to select an additional country within a region. The countries mentioned in Table 1 of the EG Report as alternates are Peru, India, Bhutan, Uzbekistan, Morocco, Angola, Chad, Ethiopia, and Sierra Leone with others being mentioned as parts of possible regional clusters. The PPCR-SC may also wish to take into consideration changes in operational conditions within the recommended countries, the balance of the pilot program in terms of regional representation, types of exposure to climate hazards etc, and seek countries from outside the above list that will enhance the learning from the overall pilot.

Annex 1 – Allocation Options for the PPCR

1) Three options for guidance for the PPCR-SC are reviewed in this Annex. They are
   a) guidance based on other relevant funds;
   b) other relevant allocation and cost estimation procedures; and
   c) guidance based on the rapidly increasing quantity of technical work on indices of vulnerability, capacity and needs assessments.

Experience from other adaptation relevant funds

2) Several other funds are already, or are about to, disburse support for adaptation related activities and may provide guidance to the PPCR-SC. These include the LDCF and SCCF of the GEF and the Adaptation Fund.

3) More broadly, the GEF4 Resource Allocation Framework (RAF) was implemented in 2006 to allocate climate change and biodiversity related GEF resources to recipient countries based on global environmental priorities and country-level performance. Each eligible country receives a minimum allocation of $1 million for each of biodiversity and climate change with additional resources based on a formula and capped to be no more than 10% (biodiversity) or 15% (climate change) of the total available resources. The climate change allocation is based on the potential for emissions reduction and is not relevant here. The special funds for adaptation (LDCF and SCCF) are not subject to the RAF. The RAF also includes a 'performance' component which is heavily weighted on the World Bank's CPIA index (see below). A mid-term assessment of the RAF by the GEF Evaluation Office in November 2008 noted that the "rules are too complex" and "have not succeeded in making the RAF transparent and assessable".

4) In GEF-5, the RAF will be replaced by the STAR (System for the Transparent Allocation of Resources) system of allocation. Again the STAR will not apply to the special adaptation funds and has only indirect lessons for the PPCR. It does bring in a component on land degradation which is likely to be related to vulnerability. This component is based on the proportion of degraded lands, of dry lands and of the population that is rural within each country. The STAR continues to use indices based on country performance and on GDP per capita. Country allocations are expected to be available within the next few months.

5) While the LDCF and the SCCF are not subject to the RAF rules and do not have pre-determined country allocations, they are subject to informal limits. Even though the total amounts identified in the NAPAs vary significantly from country to country (from $2 million to greater than $100 million), the amounts allocated through the LDCF for full size projects has usually been within the $2 million to $3 million range with a few as high as $4 million to $5 million. Limiting grants to this amount ensures that all countries have an opportunity to access the LDCF in the first round. In the SCCF individual country grants have not exceeded $6.5 million although regional grants of up to $13 million have been made.

6) The Board of the Adaptation Fund at its June 2010 meeting will discuss its initial funding priorities[2]. The Board Paper outlines several options including:

a) A uniform cap for all eligible countries;
b) A basic cap with additional value for all countries that fall within the categories of SIDS, LDC or an African country;
c) Variable caps taking into account the specific circumstances of each country. Indices based on GDP per capita , levels of vulnerability and adverse impacts and levels of urgency and risks arising from delay;
d) An allocation based on an equal rating of the regional population and the number of countries within a region (e.g. a region with 40% of the eligible countries and 70% of the population gets a cap equal to 55% of available funds).

7) The paper goes on to discuss conditions that may be used to prioritize allocations if any part of the fund is over subscribed. Options (a), (c) and elements of (b) are discussed in this annex, while option (d) is not fully applicable as the PPCR is not fully a regionally based fund[3].

8) In summary, while experience from other funds provides some insights into the issues associated with allocation of resources, none provides a direct model for the PPCR-SC.

Other relevant allocation and needs assessments

9) This section brings together a diverse set of work not directly related to allocation for adaptation, but which may further inform the PPCR-SC.

10) **IDA Allocation** – The World Bank uses the Country Policy and Institutional Assessment (CPIA) based on 16 criteria to estimate the extent to which a country's policy and institutional framework supports sustainable growth and poverty reduction, and consequently the effective use of development assistance. These criteria are the main components used to calculate a Country Performance Rating which in turn is a major component, along with population and recent performance measures, in calculating IDA allocations. Both the Asian Development Bank and the African Development Bank use the World Bank's criteria as a starting point for their respective performance-based allocation processes. Appendix Table A2 shows both the total CPIA rating (called the IRAI) and the IDA allocations calculated in preparation for IDA15. The IRAI ranges from 2.9 to 4.0 amongst the 18 pilot countries while the IDA allocation formula ranges from zero for non eligible countries (Jamaica), a few million dollars over the 3 year replenishment for small island states to almost $2 billion dollars for Bangladesh (50% of the allocation across all PPCR countries) with an average of $200 million.

11) **Economics of Adaptation to Climate Change (EACC)** –One of the most intensive analyses of country needs for adaptation is the "Economics of Adaptation to Climate Change"

[2] AFB/B.10/5 Initial Funding Priorities
[3] This formula would translate into caps of about 30% of total funds for Bangladesh and 20% for the Caribbean, down to 5% or less for 5 countries if full pilot countries are treated as 9 'regions' along with the two true regions of the Caribbean and the Pacific.

study carried out by the World Bank in partnership with the governments of the United Kingdom, Netherlands and Switzerland. This study includes intensive country level studies of three PPCR pilots (Bangladesh, Bolivia and Mozambique) but these reports are not available as yet. There was also a broader, global study which analyzed the costs of adaptation in eight sectors[4]. This analysis was designed to produce regional estimates of costs, but the methodology can be applied to countries if the results are treated with caution. The estimated costs of adaptation over the full set of pilot countries is estimated to be $3 billion per year over the period most relevant to the PPCR, i.e. 2010 to 2019, with the costs of water supply, flood control and coastal protection making up about 75% (Table below).

Costs of adaptation as estimated from the EACC study

Costs by Country 2010-2019	Annual costs $billion	Percentage		Costs by Sector 2010 - 2050	Annual costs $billion	Percentage
Bangladesh	0.656	21.6%		Agriculture	0.012	0.2%
Bolivia	0.010	0.3%		Coastal	1.704	32.3%
Cambodia	0.063	2.1%		Extreme weather	0.260	4.9%
Mozambique	0.466	15.3%		Fisheries	0.099	1.9%
Nepal	0.508	16.7%		Health	0.170	3.2%
Niger	0.050	1.6%		Infrastructure	0.837	15.9%
Tajikistan	0.000	0.0%		Water	2.193	41.6%
Yemen	0.251	8.2%				
Zambia	0.000	0.0%		Total	5.274	
Dominica	0.010	0.3%				
Grenada	0.012	0.4%				
Haiti	0.081	2.7%				
Jamaica	0.073	2.4%				
St. Lucia	0.010	0.3%				
St. Vincent	0.008	0.3%				
Papua New Guinea	0.829	27.3%				
Samoa	0.002	0.0%				
Tonga	0.014	0.5%				
Total	3.040					

12) The results suggest that 70% of the costs are incurred in four countries – Papua New Guinea, Bangladesh, Nepal and Mozambique each with costs of about $0.5 billion per year or more.

13) Again, these country level results must be treated with caution, but they suggest that the PPCR with roughly $1 billion available over about 3 years is truly only a pilot step towards full scale support. They also suggest that the bulk of the costs are likely to come from large scale infrastructure related activities in relation to water and coastal management. Many of these activities are likely to be larger than those that can be supported in the PPCR, and thus the relative costs to countries derived by the EACC study may not be a good basis for PPCR allocations.

14) **National Adaptation Plans of Action (NAPAs)** – NAPAs have been prepared by Least Developed Countries to reflect the urgent financial needs arising from the need to adapt to

[4] The Costs to developing countries of Adapting to Climate Change: New methods and estimates. Consultation Draft. The World Bank, 2010

climate change. Only 7 of the PPCR countries have prepared NAPAs and the requests vary from $8 million for Samoa to $130 million for Cambodia. The NAPA requests provide little insight to the allocation process as only a few PPCR countries have NAPAs and the NAPAs are intended to cover urgent and immediate needs for adaptation whereas the PPCR is focused on longer term goals of achieving development that is climate resilient.

Index Based Allocations

15) While there has been much discussion in the technical literature about the concept of vulnerability and indices for assessing vulnerability, and coping/adaptive capacity there have been few thoroughly worked examples. Also, vulnerability indices usually have been designed to better understand the drivers of vulnerability or to compare countries, regions, and communities in terms of the risks they face from climate change and their capacity to deal with them. This is not necessarily the same as designing an allocation index or rule to be used to allocate limited resources equitably, transparently and efficiently among countries (or other groups).

16) For allocation it would be expected that vulnerability and coping/adaptive capacity would remain a core consideration, but so also might the needs of the country in terms of its size and population (i.e. what is needed to make a difference) and its capacity to absorb funding. The goal of the CIF is to pilot transformative change in actions to respond to climate change.

17) This section first discusses several relevant indices found in the recent development and technical literature. It then goes on to explore possible newly derived indices for the PPCR.

18) **Index based on the Expert Group's Recommendations** -- The Expert Group[5] (EG) refrained from using a simple index, but instead country selection was done region by region (9 regions) and based on a suite of indices appropriate for the region. Thus the ratings are not comparable across regions and the selected countries all cluster at the top of the range for their region. The twelve indicators used by the EG may be taken as a guide but essentially a new index would need to be derived. The indicators used most consistently were:

1. HDI -- Human Dimension Index
2. CDRIa -- an index based on the proportion of the population affected by climate related disasters in the past 30 years
3. FI – the percentage of the population undernourished
4. IWS – the percentage of the population without access to improved water
5. LECZ – the percentage of the population in the low elevation coastal zone.

19) These reflect elements of both conceptual frameworks of vulnerability.

[5] *The selection of countries to participate in the pilot program for climate resilience (PPCR)*, Report of the Expert Group to the Subcommittee of the PPCR

20) **WDR2010** -- Chapter 6 of the WDR2010 Report[6] includes a discussion of "ensuring the transparent, efficient and equitable use of funds". It suggests an index based on

Allocation index =
Central government performance
× Absorptive capacity
× Social capacity

× Climate sensitivity
× Climate change exposure

× Population weight
× Poverty weight

21) The elements of a *social capacity* index based on six sub-indices are suggested along with an index of the *capacity to adapt* (five sub-indices) and *vulnerability to impacts* (four sub-indices) are suggested, but no full index is presented.

22) **Brooks et al 2005** -- Brooks and his colleagues[7] used an inductive approach to identifying indicators by analyzing the number of people killed in climate related disasters over recent decades in relation to a wide range of potential indicator variables. They found 11 that were selected as effective indicators and these were confirmed as useful by a small focus group (7 people) of adaptation experts. These experts also ranked the variables in terms of their perception of their usefulness leading to a total of 12 different rankings to which was added an0 equal ranked set to give 13 measures of vulnerability. Countries were then scored against these 13 rankings and the number of times a country appeared in the top quintile of countries in a particular ranking was used as an indicator of its overall vulnerability. The outcome is listed in Table 3 and this index entered into the PPCR Expert Group's country selection process where data were available. Six PPCR pilot countries appear in the list (Mozambique[13] , Niger [13], Yemen [11], Nepal [4] Bangladesh [1] & Cambodia

Ranking from Brooks et al 2005

Most vulnerable countries		Moderately to highly vulnerable	
Afghanistan	13	*Cote d'Ivoire*	10
Angola	13	Qatar	10
Burundi	13	*Kenya*	9
Central African Rep.	13	Laos	9
Democratic Republic of Congo	13	North Korea	8
		Yugoslavia	7
Eritrea	13	*Nigeria*	7
Ethiopia	13	*Benin*	6
Equatorial Guinea	13	**Turks and Caicos Islands**	6
Gambia	13	Bosnia Herzegovina	5
Guinea Bissau	13	*Congo*	5
Haiti	13	*Mali*	5
Mauritania	13	**Guadeloupe**	5
Mozambique	13	*Senegal*	5
Niger	13	**Tonga**	5
Pakistan	13	Nepal	4
Rwanda	13	*Djibouti*	3
Sierra Leone	13	*Zimbabwe*	3
Somalia	13	Azerbaijan	2
Sudan	13	Puerto Rico	2
Togo	13	Bangladesh	1
Turkmenistan	12	Bhutan	1
Chad	12	Estonia	1
Gabon	12	Cambodia	1
Iraq	12	*Uganda*	1
Liberia	12	United Arab Emirates	1
Malawi	11	French Guiana	1
Brunei Darussalam	11	Morocco	1
Burkina Faso	11	**Wallis and Futuna Islands**	1
Guinea	11		
Yemen			

[6] WDR2010 ref
[7] Brooks et al ref

[1]) and two countries from the regional groups (Haiti [13] and Tonga [5]).

23) **World Bank IDA15 most vulnerable list 2008** – Countries were ranked in terms of several different climate impacts (drought, storms, threat to agriculture etc). For each impact rankings based on the absolute number of people affected, the proportion of the people affected and the number of people affected per $million of GDP were summed to give the overall ranking for that impact. However, no attempt was made to combine the rankings for the different impacts as the purpose of the analysis was only to contrast the respective rankings of LDCs, MICs and developed countries. The results are shown in the table below. Five of the 9 PPCR pilot countries and 3 of the regional countries appear in the list (Bangladesh, Mozambique and Niger multiple times).

Table 1. Countries most at risk from climate-related threats

Drought	*Flood*	*Storm*	*Coastal 1m* [a]	*Coastal 5m* [a]	*Agriculture*
Malawi	Bangladesh	Philippines	All low-lying Island States	All low-lying Island States	Sudan
Ethiopia	China	Bangladesh	Vietnam	**Netherlands**	Senegal
Zimbabwe	India	Madagascar	Egypt	**Japan**	Zimbabwe
India	Cambodia	Viet Nam	Tunisia	Bangladesh	Mali
Mozambique	Mozambique	Moldova [b]	Indonesia	Philippines	Zambia
Niger	Laos	Mongolia [b]	Mauritania	Egypt	Morocco
Mauritania	Pakistan	Haiti	China	Brazil	Niger
Eritrea	Sri Lanka	Samoa	Mexico	Venezuela	India
Sudan	Thailand	Tonga	Myanmar	Senegal	Malawi
Chad	Viet Nam	China	Bangladesh	Fiji	Algeria
Kenya	Benin	Honduras	Senegal	Vietnam	Ethiopia
Iran	Rwanda	Fiji	Libya	**Denmark**	Pakistan

Note: Bold and grey shaded = high income countries. Light green = IBRD. Non-shaded = IDA-only and blend countries. The typology is based on both absolute effects (e.g., total number of people affected) and relative effects (e.g., number affected as a share of GDP). See Annex C for more detail on the indices used.

a. Meters above the seal level.

b. Winter storms.

24) **Other indices** – Eriksen & Kelly (2006) compared five national level measures of vulnerability published over the period 1995 to 2003. Between them, 29 indicators were used with only five appearing in more than one study. They were able to compare the top 20 ranked countries derived from three of the studies (see table below). Only five countries appear more than once and only one (Cambodia) in all three lists; 49 countries appeared only once. Seven of the pilot countries (Bangladesh [2], Cambodia [3], Mozambique, Niger, Tajikistan, Yemen and Zambia) and one regional country (Haiti) appear in the list.

25) This study, along with the studies listed above it, confirms the enormous diversity in indicators used and ranking outcomes. Most PPCR countries appear in at least one list, but high ranked countries in one list can be missing from another.

Comparison of countries ranked among 20 most vulnerable[a] in three national-level indicator studies[b]

Vulnerability rank	Study		
	Vulnerability-resilience indicators	Environmental sustainability index	Country-level risk measures
1	Yemen	Angola	**Malawi**
2	India	Sierra Leone	Antigua & Barbuda
3	Tunisia	Ethiopia	Kiribati
4	**China**	Zaire	Guyana
5	Egypt	Somalia	Zimbabwe
6	**Bangladesh**	Chad	Philippines
7	Senegal	Liberia	**China**
8	South Africa	Guinea-Bissau	Australia
9	Libya	Niger	Swaziland
10	Thailand	Mozambique	Djibouti
11	Nigeria	Rwanda	**Bangladesh**
12	Ukraine	Burundi	Laos
13	Sudan	Zambia	Mongolia
14	Uzbekistan	**Malawi**	Kenya
15	Saudi Arabia	Haiti	**Iran**
16	Mexico	Madagascar	**Cambodia**
17	**Iran**	Guinea	Moldova
18	**Cambodia**	**Cambodia**	Tajikistan
19	Republic of Korea	Mali	Belize
20	Poland	Central African Rep.	Fiji

26) A New Quantitative Index

In developing a basis for allocation certain clusters of indicators suggest themselves. The first is some measure of size as costs of adaptation are likely to increase with the number of people or the area of land exposed to climate hazards. Exposure itself is another factor to be considered. This is difficult to estimate directly but the number of people affected by recent climate related disasters or the number of such disasters within the country may be used as an indicator. Another cluster might center on the social and economic capacity to cope with climate hazards. This could be measured by a series of indices such as access to improved water supply, undernourishment etc as in the EG Report or an existing index such as the HDI or PPP-GDP/capita could be used. In the following analyses the latter approach is taken. As pointed out in the EG Report more specific indices should be adjusted to the nature of the threats relevant to a region and the previous section shows that widely different rankings can be derived when applied globally. A third cluster might center on the capacity to quickly and effectively apply

the resources in a pilot such as the PPCR. Here the CPIA or IRAI as used by the World Bank in allocating IDA resources is a possible candidate.

27) Even without a detailed analysis it is clear that developing a single composite index will lead to some difficult issues. For example across all the pilot countries Bangladesh has half the total population, three fourths of the people affected by climate related disasters in the past 30 years, and receives half of the IDA allocation of the group of pilots. Bolivia and Niger contribute almost half the land area while Tonga contributes only a tiny fraction of a percent of the land area, but almost all of that is vulnerable to storm surges and seal-level rise. How do we balance these different circumstances in a quantitative index? Pilot countries differ by factors of 1000 or more in some important comparisons. Thus, for an effective allocation within the pilot, a quantitative index would need to be subject to caps and minimum allocations.

28) Another approach that takes the same information into account, but avoids using quantitative indices, is to cluster countries in a small number of groups based on relevant indicators but only by broad categories (e.g. high, middle, low population) and not on quantitative metrics. The groups could then be allocated appropriate caps. This is similar to the approach in Brooks et al and IDA15 above.

29) Annex 2 presents some analyses of potential indicators for allocation decisions. These ideas are meant simply as guidance to the PPCR-SC as to the types of analyses available and implications that arise.

30) However, some consistent results emerge from the analyses. Three countries, Bangladesh, Mozambique and Niger, consistently appear among the top few rankings. The ranking of the other countries and regions are much more variable. In the regions, the Caribbean usually ranks higher than the Pacific largely due to the influence of Haitian statistics.

31) A simple allocation tool is also provided in Annex 1 for others to explore the outcomes of different allocation rules. The tool allows users to vary, among others, the maximum and minimum caps on allocations and equal or different ‘quotas’ based on assessed needs.

Annex 2

1) To better understand the quantitative differences and similarities between countries a small set of possible indicators were gathered (Table A1)[8]. The first set is an indicator of 'size' as the costs of adaptation are likely to increase with the number of people or the area of land exposed to climate hazards. Similarly for the allocation needed for the PPCR to have a transformational impact is likely to increase with the size of the national economy, here represented as PPP GDP. The next cluster centers on the social and economic capacity to cope with climate hazards. Here the Human Dimension Index is used as a composite indicator along with PPP-GDP/capita. The IRAI is used as an indicator of the capacity to quickly and effectively apply the resources in a pilot such as the PPCR. Exposure and vulnerability to climate risks is a core indicator and is difficult to estimate directly. Here a number of measures of the impacts of climate related disasters in the recent past (1978-2007) are taken as indicators.

Table A1: Possible Indicators

Indicators of the "size" of the country	**Description and source**
Area (km2)	
Pop (M)	
PPP GDP ($M)	
Indicators of poverty	
PPP/cap ($/cap)	
HDI 2007	
Indicator of readiness	
IRAI	
Indicators of climate impacts	
Events	
Number Affected	
Deaths	
Affected per cap	
Affected per $M PPP GDP	
Other related indicators	
IDA allocation ($M)	
EACC estimate of costs ($M)	
NAPA submission ($M)	

[8] Throughout the analyses presented here, only the PPCR countries are considered, either as a set of 18 countries or as the set of 9 country pilots and 2 regional pilots.

Table A2 Note: An IRAI for Jamaica is not available. For consistency of analysis a dummy IRAI was calculated based on the observed correlation between IRAI scores and the HDI and PPP / cap.

	Area (km2)	Pop (M)	PPP GDP ($M)	PPP/cap ($/cap)	HDI 2007	IRAI	Events	Affected	Deaths	Aff / cap	Aff per $M	IDA alloc ($M)	EACC cost ($M)	NAPA ($M)
Bangladesh	144,000	159.0	206,658	1300	0.54	3.53	178	222,483,691	161,095	2.59	1226	1918.4	656	77
Bolivia	1,098,580	9.8	39,440	4013	0.73	3.78	33	5,744,731	786	0.62	189	115.2	10	
Cambodia	181,040	14.3	25,901	1806	0.59	3.29	17	16,083,614	1,153	1.47	507	130.9	63	129
Mozambique	801,590	20.5	17,019	830	0.40	3.68	41	33,235,468	201,670	2.13	1415	316.6	466	9
Nepal	147,180	24.1	29,040	1207	0.55	3.31	34	6,743,094	5,157	0.28	149	448.0	508	
Niger	1,267,000	13.4	8,902	667	0.34	3.30	20	16,577,103	123	1.32	1137	232.3	50	
Tajikistan	143,100	6.4	11,818	1841	0.69	3.17	17	3,734,060	1,493	0.67	501	62.5	0	
Yemen	527,970	22.3	52,051	2335	0.58	3.19	14	324,059	722	0.02	18	231.8	251	30
Zambia	752,610	12.2	15,917	1309	0.48	3.51	17	8,698,933	27	1.18	1028	166.0	0	15
Haiti	27,750	8.6	11,141	1291	0.53	2.86	38	5,925,540	7,779	0.50	237	30.9	10	24
Jamaica	10,990	2.7	20,674	7697	0.77	3.70	20	2,138,231	240	0.75	168	0.0	12	
Dominica	750	0.1	651	9043	0.81	3.85	14	96,231	50	0.19	37	2.8	81	
St Lucia	620	0.2	1,790	10654	0.82	3.88	7	83,950	78	0.60	84	6.5	73	
St Vincent & Grenadines	390	0.1	1,043	9751	0.77	3.83	7	23,694	8	0.21	30	4.7	10	
Grenada	340	0.1	1,108	10456	0.81	3.72	3	62,860	41	0.75	78	4.2	8	
Papua New Guinea	462,840	6.1	11,944	1972	0.54	3.25	12	1,469,573	400	0.21	69	49.1	829	
Samoa	2,840	0.2	1,029	5446	0.77	3.99	7	284,000	32	1.72	285	7.9	2	
Tonga	750	0.1	528	5129	0.77	3.19	8	172,688	9	1.74	216	3.2	14	
Caribbean	40,840	11.8	36,407	3093	0.60	3.09	89	8,330,506	8,196	0.55	215	49.1	194	24
Pacific	466,430	6.3	13,501	2127	0.55	3.27	27	1,926,261	441	0.28	77	60.2	845	-
Sum	5,570,340	300.1	456,655				487	323,881,520	380,863			3,731	3,043	284
Average	309,463	16.7	25,370	4,264	0.64	3.50	27	17,993,418	21,159	0.94	410	219.3	435	41

2) It is clear that many of the indicators show a wide numerical range; for example a 3,700 fold difference in land area, 1,600 fold difference in population and even a 120 fold difference in the proportion of the population affected by a climate related disaster over a 30 year period. This means that allocation based on these quantitative values are likely to produce a similarly wide range in allocated amounts. The usual treatment of such data to reduce a wide ranging outcome is either to apply transformations (such as log transforms), to use ranked or category data (e.g. High, Medium, Low) and/or to cap the allocation amounts.

Table A3 Correlations (Pearson's r) between indicators

	Area (km2)	*Pop (M)*	*PPP GDP ($M)*	*PPP/cap ($/cap)*	*HDI 2007*	*IRAI*	*Events*	*Affected*	*Deaths*	*Aff / cap*	*Aff per $M*	*IDA alloc ($M)*
Area (km2)	1.00											
Pop (M)	0.53	1.00										
PPP GDP ($M)	0.44	***0.76***	1.00									
PPP/cap ($/cap)	-0.56	***-0.76***	-0.49	1.00								
HDI 2007	***-0.69***	***-0.76***	-0.33	***0.85***	1.00							
IRAI	-0.09	-0.44	-0.29	***0.69***	0.53	1.00						
Events	0.42	0.65	0.46	-0.62	-0.58	-0.32	1.00					
Affected	0.56	0.61	0.18	-0.58	***-0.73***	-0.12	0.64	1.00				
Deaths	0.29	0.39	0.05	-0.27	-0.42	0.11	0.53	***0.80***	1.00			
Aff / cap	0.21	0.04	-0.24	-0.26	-0.26	0.09	0.10	0.61	0.51	1.00		
Aff per $M	0.63	0.44	-0.00	-0.57	***-0.74***	-0.10	0.42	***0.87***	0.63	***0.70***	1.00	
IDA alloc ($M)	0.52	***0.93***	0.57	***-0.66***	***-0.71***	-0.27	0.61	0.61	0.42	0.10	0.48	1.00
EACC cost ($M)	0.18	0.45	0.24	-0.38	-0.43	-0.21	0.25	0.24	0.36	-0.18	0.03	0.48

Bangladesh is excluded from the data set as an outlier

3) Many of the indicators used may be redundant in that they duplicate the information in other indicators. The correlation table shows that several of the indicators convey essentially the same information and thus little additional discrimination between the countries. These include some correlations that might be expected, such as between population and GDP and some that arise from the method of calculation, such as PPP GDP/cap which is a major part of the HDI, although PPP/cap is also strongly correlated with IRAI which does not use PPP/cap directly.

4) In the following analyses the regions are treated as two single pilots within the allocation process. The indicators for the regions were either summed over the countries within the region (e.g. the total population across all 6 countries in the Caribbean) or a population weighted average was calculated for per capita indicators such as the HDI.

5) There is a multitude of ways that an index can be calculated and many were tried in this analysis. For example, the countries were given a rank score on each variable (high rank for high needs) and the ranked scores across all variables summed to give an overall ranking. Bangladesh and Mozambique ranked the highest [both 103] followed by Niger [79] and then a cluster of countries (Nepal, Zambia, Cambodia, Bolivia [all in 60s].

	Area (km2)	Pop (M)	PPP GDP ($M)	PPP/cap ($/cap)	HDI 2007	IRAI	Events	Affected	Deaths	Aff / cap	Aff per $M	Summed rank
Bangladesh	3	11	11	8	8	9	11	11	10	11	10	103
Bolivia	10	3	9	1	1	11	7	4	5	5	4	60
Cambodia	5	7	6	6	4	5	2	8	6	9	7	65
Mozambique	9	8	5	10	10	10	9	10	11	10	11	103
Nepal	4	10	7	9	6	7	8	5	8	2	3	69
Niger	11	6	1	11	11	6	5	9	2	8	9	79
Tajikistan	2	2	2	5	2	2	2	3	7	6	6	39
Yemen	7	9	10	3	5	3	1	1	4	1	1	45
Zambia	8	5	4	7	9	8	2	7	1	7	8	66
Caribbean	1	4	8	2	3	1	10	6	9	4	5	53
Pacific	6	1	3	4	7	4	6	2	3	3	2	41

6) The data indicators could also be converted to three categories (high, medium, low) based on their ranks and these scored in a similar way. The averaging process across the indicators could be calculated as arithmetic means, geometric means, frequency of High category scores, etc. The indicators were also averaged across the blocks of indicators for size, need, capacity and impact as shown in Table A1 and similar analysis performed. Similarly cluster analysis and factor analysis were also tried.

7) Each approach produced different results in terms of the precise rankings and groupings, but working with these data either as ranked data or categorical data did lead to some consistent results. Bangladesh and Mozambique were consistently ranked the highest (i.e. implying a greater allocation), closely followed by Niger. Tajikistan and the Pacific region most often ranked amongst the lowest. Other countries varied in their middle rank positions.

A needs based allocation tool based on a small number of country categories

8) A simple needs based allocation tool is described below and provided as a spreadsheet for the guidance of the PPCR-SC. It allows countries to be given allocation quotas and the impact on the allocation assessed. The quotas, for example, could be 1 quota for all countries but with exceptions made for countries ranking consistently high in the needs analyses (e.g. Bangladesh, Mozambique and Niger allocated 1.5 quotas), and for regional groups (Caribbean with 6 countries allocated 2 quotas and the Pacific 1.5). A minimum allocation, below which it would be inefficient to implement pilots, can be set separately for full pilot countries and for regional countries and a maximum cap set for all pilot countries and regions. The amount to be allocated must also be specified and the results can be rounded to a simple multiple of $5 million or $10 million etc (The rounded sum will not always be exactly equal to the amount to be allocated). The examples below show some outcomes of such allocations.

Example 1 – Equal quotas for all pilot countries; regions receive 1.5 quotas

	Alloc Quota	Allocation $ million	Rounded $ million
Bangladesh	1.0	50	50
Bolivia	1.0	50	50
Cambodia	1.0	50	50
Mozambique	1.0	50	50
Nepal	1.0	50	50
Niger	1.0	50	50
Tajikistan	1.0	50	50
Yemen	1.0	50	50
Zambia	1.0	50	50
Caribbean	1.5	75	75
Pacific	1.5	75	75
Totals	12.0	600	600

Variables	$ Million
Min Alloc Pilot Country	30
Min Alloc Regional country	10
Max cap - all countries or regions	100
Rounding	5
Amount to be allocated	600
Rate	50

Example 2 – 1.5 quotas for three high need countries; 2 quotas for the 6 country Caribbean Region and 1.5 quotas for the 3 country Pacific region

	Alloc Quota	Allocation $ million	Rounded $ million
Bangladesh	1.5	65	65
Bolivia	1.0	43	45
Cambodia	1.0	43	45
Mozambique	1.5	65	65
Nepal	1.0	43	45
Niger	1.5	65	65
Tajikistan	1.0	43	45
Yemen	1.0	43	45
Zambia	1.0	43	45
Caribbean	2.0	86	85
Pacific	1.5	65	65
Totals	14.0	602	615

Variables	$ Million
Min Alloc Pilot Country	30
Min Alloc Regional country	10
Max cap - all countries or regions	100
Rounding	5
Amount to be allocated	600
Rate	43

Example 3 – Further differentiation between countries.

	Alloc Quota	Allocation $ million	Rounded $ million
Bangladesh	2.0	80	80
Bolivia	1.0	40	40
Cambodia	1.0	40	40
Mozambique	2.0	80	80
Nepal	1.0	40	40
Niger	1.5	60	60
Tajikistan	1.0	40	40
Yemen	1.0	40	40
Zambia	1.0	40	40
Caribbean	2.0	80	80
Pacific	1.5	60	60
Totals	**15.0**	**600**	**600**

Variables	$ Million
Min Alloc Pilot Country	30
Min Alloc Regional country	10
Max cap - all countries or regions	100
Rounding	5
Amount to be allocated	600
Rate	40

A Spreadsheet Tool

9) The table below is a live Excel Worksheet. Double click inside it and you can run new scenarios. Change only the cells shaded yellow. Change the Allocation Quotas and or the Variables to suit your scenario. Then manually change the Rate variable until the Total allocated amount is approximately equal to the target amount. It will not always be possible to get an exact match.

Bangladesh	1.0	53	55
Bolivia	1.0	53	55
Cambodia	1.0	53	55
Mozambique	1.0	53	55
Nepal	1.0	53	55
Niger	1.0	53	55
Tajikistan	1.0	53	55
Yemen	1.0	53	55
Zambia	1.0	53	55
Caribbean	1.0	60	60
Pacific	1.0	53	55
Totals	**11.0**	**590**	**610**

Min Alloc Pilot Country	30
Min Alloc Regional country	10
Max cap - all countries or regions	100
Rounding	5
Amount to be allocated	600
Rate	53