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3 **Working Group II Contribution to the**
4 **Intergovernmental Panel on Climate Change**
5 **Fourth Assessment Report**
6

7 **Climate Change 2007:**
8 **Climate Change Impacts, Adaptation and Vulnerability**
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13 **Introduction to the Working Group II Contribution**
14

15 Confidential Draft for comment by
16 Governments and Experts
17

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19
20 Important Note: This draft is not in its final form. Its content will undergo
21 revision in response to comment. Therefore its contents should not be
22 circulated¹ or published.
23

24 A draft prepared by

25
26 Osvaldo Canziani, Martin Parry, Jean Palutikof
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30 **A. The Intergovernmental Panel on Climate Change**
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32 The Intergovernmental Panel on Climate Change (IPCC) was established by the World Meteorological
33 Organization and the United Nations Environment Programme in 1988, in response to the widespread
34 recognition that human-influenced emissions of greenhouse gases have the potential to alter the
35 climate system. Its role is to provide an assessment of the understanding of all aspects of climate
36 change.
37

38 At its first session, the IPCC was organized into three Working Groups. The current remits of the
39 three Working Groups are for Working Group I to examine the scientific aspects of the climate system
40 and climate change, Working Group II to address vulnerabilities to, impacts of and adaptations to
41 climate change, and Working Group III to explore the options for mitigation of climate change. The
42 three previous assessment reports were produced in 1990, 1996 and 2001.

¹ That is, circulation beyond that appropriate for a managed review.

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2 B. The Working Group II Fourth Assessment

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4 The decision to produce a Fourth Assessment Report (AR4) was taken by the 19th Session of the IPCC
5 at Geneva in April 2002. The report was to be more focussed and shorter than before. The Working
6 Group II AR4 was to be finalized in mid-2007.

7

8 The IPCC Fourth Assessment is intended to be a balanced assessment of current knowledge. Its
9 emphasis is on new knowledge acquired since the IPCC Third Assessment (2001). This requires a
10 survey of all published literature, including non-English language and ‘grey’ literature such as
11 government and NGO reports.

12

13 At the 20th session of the IPCC, in February 2003, four key questions were identified as central to the
14 Working Group II assessment. These were:

- 15 1. What is the current state of knowledge on impacts of climate change?
- 16 2. What is the state of knowledge on impacts under different levels of adaptation?
- 17 3. What are the impacts under different levels of mitigation?
- 18 4. What is the state of knowledge concerning observed effects?

19 These questions are central to the structure and content of the Working Group II AR4.

20

21 Two meetings were held in 2003 to scope the Fourth Assessment, from which emerged the outline for
22 the Working Group II AR4 submitted to IPCC Plenary 21 in November 2003 for approval and
23 subsequent acceptance. This outline was designed in full knowledge of the four key questions above.
24 It provides the framework for the preparation, writing and final presentation of the final AR4.

25

26 The Report has twenty chapters which together provide a comprehensive assessment of the climate
27 change literature as it addresses the four key questions posed above. These are shown in Table I.1.
28 The opening chapter is on observed changes, and addresses the question of whether observed changes
29 in the natural and managed environment can be attributed to anthropogenic climate change. Chapter 2
30 deals with the methods available for impacts analysis, and with the scenarios of future climate change
31 which underpin these analyses. These are followed by the core chapters, which assess the literature on
32 present day and future climate change impacts on systems, sectors and regions, vulnerabilities to these
33 impacts, and strategies for adaptation. Chapters 17 and 18 consider possible responses through
34 adaptation and the synergies with mitigation. The two final chapters look at key vulnerabilities, and
35 the interrelationships between climate change and sustainability.

36

37 Chapters 9 to 16 of the WGII AR4 consider regional climate change impacts. The definitions of these
38 regions are shown in Table I.2.

39

1 **Table I.1:** The chapters of the Working Group II contribution to the IPCC Fourth Assessment
 2
 3

4	Section A.	ASSESSMENT OF OBSERVED CHANGES
5	1.	Assessment of Observed Changes and Responses in Natural and Managed
6		Systems
7		
8	Section B.	ASSESSMENT OF FUTURE IMPACTS AND ADAPTATION: SYSTEMS AND
9		SECTORS
10	2.	New Assessment Methodologies and the Characterisation of Future Conditions
11	3.	Fresh Water Resources and their Management
12	4.	Ecosystems, their Properties, Goods and Services
13	5.	Food, Fibre and Forest Products
14	6.	Coastal Systems and Low-lying Areas
15	7.	Industry, Settlement, and Society
16	8.	Human Health
17		
18	Section C.	ASSESSMENT OF FUTURE IMPACTS AND ADAPTATION: REGIONS
19	9:	Africa
20	10:	Asia
21	11:	Australia and New Zealand
22	12:	Europe
23	13:	Latin America
24	14:	North America
25	15:	Polar Regions (Arctic and Antarctic)
26	16:	Small Islands
27		
28	Section D.	ASSESSMENT OF RESPONSES TO IMPACTS
29	17.	Assessment of Adaptation Practices, Options, Constraints and Capacity
30	18.	Inter-relationships between Adaptation and Mitigation
31	19.	Assessing Key Vulnerabilities and the Risk from Climate Change
32	20.	Perspectives on Climate Change and Sustainability
33		

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 35

36 **C. Procedures followed in this Assessment by the authors, reviewers and**
 37 **participating governments**

39 In total, the WGII AR4 involved 47 Co-ordinating Lead Authors (CLAs), 127 Lead Authors (LAs),
 40 and 47 Review Editors (REs), drawn from 74 countries. In addition there were 214 Contributing
 41 Authors and 837 Expert Reviewers.

42
 43 Each chapter in the Working Group II Fourth Assessment had a writing team of 2 to 4 CLAs and 6 to
 44 9 LAs. Led by the CLAs, it was the responsibility of this writing team to produce the drafts and
 45 finished version of the chapter. Where necessary, they could recruit Contributing Authors to assist in
 46 their task. Three drafts of each chapter were written prior to the production of the final version.
 47 Drafts were reviewed in two separate cycles of revision, by experts and by governments. It was the
 48 duty of the REs (2 to 3 per chapter) to ensure that the review comments were properly addressed by
 49 the authors.

50

1 The authors and review editors were selected by the Co-Chairs and Vice-Chairs of WGII from the lists
 2 of experts nominated by governments. Due regard was paid to the need to balance the writing team
 3 with proper representation from developing and developed countries, and Economies in Transition. In
 4 the review by experts, Chapters were sent out to experts who included all those nominated by
 5 governments but not yet included in the assessment, together with scientists and researchers identified
 6 by the Co-Chairs and Vice-Chairs from their knowledge of the literature and the global community of
 7 research.

8 9 **D. Communication of Uncertainty in the Working Group II AR4**

10 A set of terms to describe uncertainties in current knowledge is common to all parts of the IPCC
 11 Fourth Assessment. This is based around a Guidance Note, produced following (a) a Workshop on
 12 Uncertainty and Risk held in Maynooth, Ireland, in May 2004, and (b) extensive discussions between
 13 the three Working Groups.
 14

15 16 **D.1 Description of confidence**

17 Authors have assigned a confidence level to the major statements in the Technical Summary on the
 18 basis of their assessment of current knowledge, as follows:
 19
 20

Terminology	Degree of confidence in being correct
Very high confidence	At least 9 out of 10 chance of being correct
High confidence	About 8 out of 10 chance
Medium confidence	About 5 out of 10 chance
Low confidence	About 2 out of 10 chance
Very low confidence	Less than a 1 out of 10 chance

21 22 **D.2 Description of likelihood**

23 Likelihood refers to a probabilistic assessment of some well defined outcome having occurred or
 24 occurring in the future, and may be based on quantitative analysis or an elicitation of expert views. In
 25 the Technical Summary, when authors evaluate the likelihood of certain outcomes, the associated
 26 meanings are:
 27

Terminology	Likelihood of the occurrence/ outcome
Virtually certain	>99% probability of occurrence
Very likely	90 to 99% probability
Likely	66 to 90% probability
About as likely as not	33 to 66% probability
Unlikely	10 to 33% probability
Very unlikely	1 to 10% probability
Exceptionally unlikely	<1% probability

1 **Table I.2:** Countries by Region for WG2 AR4

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Africa Algeria Angola Benin Botswana Burkina Faso Burundi Cameroon Central African Republic Chad Congo Congo, Democratic Rep. of Cote d'Ivoire Djibouti Egypt Equatorial Guinea Eritrea Ethiopia Gabon Ghana Guinea Guinea-Bissau Kenya Lesotho Liberia Libya Madagascar Malawi Mali Mauritania Morocco Mozambique Namibia Niger Nigeria Reunion Rwanda Senegal Sierra Leone Somalia South Africa Sudan Swaziland Tanzania The Gambia Togo Tunisia Uganda Zambia Zimbabwe	Asia Afghanistan Bahrain Bangladesh Bhutan Brunei Darussalam Cambodia China Hong Kong India Indonesia Iran, Islamic Republic of Iraq Israel Japan Jordan Kazakstan Korea, Dem. People's Rep. Korea, Republic Kuwait Kyrgyz Republic Laos Lebanon Malaysia Mongolia Myanmar Nepal Oman Pakistan Papua New Guinea Philippines Qatar Russia – EAST OF THE URALS Saudi Arabia Singapore Sri Lanka Syria Tajikistan Thailand Turkey Turkmenistan United Arab Emirates Uzbekistan Viet Nam Yemen	Europe Albania Andorra Armenia Austria Azerbaijan Belarus Belgium Bosnia and Herzegovina Bulgaria Croatia Czech Republic Denmark Estonia Finland France Georgia Germany Greece Hungary Iceland Ireland Italy Latvia Liechtenstein Lithuania Luxembourg Macedonia Moldova, Republic of Monaco Norway Poland Portugal Romania Russia – WEST OF THE URALS San Marino Serbia Slovak Republic Slovenia Spain Sweden Switzerland The Netherlands Ukraine United Kingdom	Latin America Argentina Belize Bolivia Brazil Chile Colombia Costa Rica Ecuador El Salvador French Guiana Guatemala Guyana Honduras Mexico Nicaragua Panama Paraguay Peru Suriname Uruguay Venezuela Small Islands: SI States together with non-autonomous small islands Antigua and Barbuda Bahamas Barbados Cape Verde Comoros Cook Islands Cuba Cyprus Dominica Dominican Republic Fed. States of Micronesia Fiji Grenada Haiti Jamaica Kiribati Maldives Malta Marshall Islands Mauritius Nauru Palau Saint Kitts and Nevis Saint Lucia Saint Vincent & Grenadines Samoa Sao Tome and Principe Seychelles Solomon Islands Tonga Trinidad and Tobago Tuvalu Vanuatu
Australia and New Zealand Australia New Zealand	North America Canada USA (inc Hawaii)	Polar Regions	

1 **E. Definitions of key terms: Climate Change, Climate Change Impacts, Adaptation,**
2 **Adaptive Capacity, and Vulnerability**

3
4 Definitions for key terms used in the WGII AR4 are as follows:

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6 *Climate change* is a statistically significant variation in either the mean state of the climate or in its
7 variability over an extended period (typically decades or longer). This definition includes climate
8 changes due to natural causes, and so differs from that of the United Nations Framework Convention
9 on Climate Change where climate change is “a change of climate which is attributed directly or
10 indirectly to human activity that alters the composition of the global atmosphere and which is in
11 addition to natural climate variability observed over comparable time periods”.

12
13 *Climate change impacts* are the consequences of climate change on natural and human systems.

14
15 *Adaptation* is the adjustment in natural or human systems in response to actual or expected climatic
16 stimuli or their effects, which moderates harm or exploits beneficial opportunities.

17
18 *Adaptive capacity* is the ability of a system to adjust to climate change (including climate variability
19 and extremes) to moderate potential damages, to take advantage of opportunities, or to cope with the
20 consequences.

21
22 *Vulnerability* is the degree to which a system is susceptible to, or unable to cope with, adverse effects
23 of climate change, including climate variability and extremes. Vulnerability is a function of the
24 character, magnitude, and rate of climate change and variation to which a system is exposed, its
25 sensitivity, and its adaptive capacity.