Annex 1
Ramsar COP Resolution VIII 34

RESOLUTION VIII.34

AGRICULTURE, WETLANDS AND WATER RESOURCE MANAGEMENT

1. RECOGNIZING that agriculture, whether large- or small-scale, shifting or permanent, extensive or intensive, commercial or subsistence, including crop production, animal breeding, pastoralism, horticulture, and plantation, is an essential activity for human survival and food security at local, national and global levels, and for sustaining livelihoods;
2. ALSO RECOGNIZING that in many parts of the world, agricultural activity has been responsible for creating distinctive and characteristic landscapes, including wetland ecosystems;
3. FURTHER RECOGNIZING that agriculture is also a major form of land use and that river valleys, floodplains, and coastal lowlands in particular have frequently been used for agriculture because of their natural suitability and the demands of agriculture for flat, fertile land and a ready supply of fresh water, and that therefore there is a high priority to ensuring that agricultural practices are compatible with wetland conservation objectives;
4. AWARE that wetlands can play important roles in relation to agriculture, such as abating the effects of storm and flood events, thus helping to protect both habitation and agricultural land, contributing to the replenishment of aquifers that are the source of water for irrigation, and constituting the habitat of wild relatives of cultivated crops and grasses;
5. NOTING the high dependence of local communities on wetland resources, particularly in developing countries and notably in terms of small-scale subsistence agriculture, domestic water supply, and other uses that may contribute directly to poverty alleviation;
6. ALSO NOTING that the poor, in particular women, often depend on wetland resources for their livelihoods and can be severely disadvantaged if wetlands are degraded or lost;
7. CONSCIOUS on the one hand that drainage and intensive cultivation of such areas have led to widespread and continuing wetland loss, and on the other hand that sustainable agriculture supports some important wetland ecosystems;
8. AWARE that agriculture can have impacts on water quantity and quality, and in particular that agriculture is a) a major user of water, and b) in certain cases, a major polluter, for example through pollution of surface and groundwater due to the runoff of fertilizers and plant protection products such as herbicides, fungicides and pesticides; and REALIZING that the precise impacts of agriculture on wetlands and water resources vary within and between regions, depending upon natural conditions and upon the type of technologies applied;
9. NOTING that uncertainties relating to wetland tenure systems and user rights over wetlands and water resources can have severe negative impacts on sustainable wetland management and in particular on poor communities that depend upon wetlands resources;
10. FURTHER AWARE that economic hardship in many parts of the world is causing people to practice some forms of unsustainable agriculture, resulting in

degradation of natural resources, including vegetation, soil and fresh water, and that these phenomena may be exacerbated by the direct or indirect effects of agricultural policies and practices in other parts of the world;

11. CONCERNED that global climate change and accelerated desertification are projected to have major impacts on future patterns of availability and distribution of water, and on the functions and values of wetlands, as well as on agricultural production;
12. CONVINCED that, in conformity with the Ramsar 'wise use' concept (as defined by the Conference of Parties), concerted efforts are required to achieve a mutually beneficial balance between agriculture and the conservation and sustainable use of wetlands, and to prevent or minimize the adverse effects from agricultural practices on the health of wetland ecosystems throughout the world, taking into account the precautionary approach as set out in Principle 15 of the Rio Declaration on Environment and Development;
13. FURTHER CONVINCED of the important role in the area of agriculture and water of United Nations specialized agencies and programmes and relevant international initiatives;
14. AWARE of the Dialogue on Water, Food and the Environment coordinated by the International Water Management Institute (IWMI) and involving a broad range of international partners;
15. TAKING INTO CONSIDERATION the information and guidance contained in the Ramsar Handbooks for the wise use of wetlands, especially the *Guidelines for integrating wetland conservation and wise use into river basin management* adopted by the 7th Conference of the Contracting Parties, as well as the River Basin Initiative being developed jointly by the Secretariats of this Convention and the Convention on Biological Diversity (CBD), and Ramsar COP7 Resolutions VII.8 and VII.21, paragraph 15;
16. FURTHER TAKING INTO CONSIDERATION the CBD Decision III/11 on Conservation and sustainable use of agricultural biological diversity and the multi-year Work Programme in Decision V/5; and TAKING INTO ACCOUNT the relevant sections of the 3rd Joint Work Plan 2002-2006 between the CBD and the Ramsar Convention, in particular Activity 5;
17. REALIZING that the present meeting of the Conference has adopted further guidance relevant to agriculture, wetlands and water resource management, notably the Resolutions on *Guidelines for the allocation and management of water for maintaining the ecological functions of wetlands* (Resolution VIII.1), *New Guidelines for management planning for Ramsar sites and other wetlands* (Resolution VIII.14), *The Report of the World Commission on Dams (WCD) and its relevance to the Ramsar Convention* (Resolution VIII.2), *Climate change and wetlands: impacts, adaptation and mitigation* (Resolution VIII.3), *Principles and guidelines for wetland restoration* (Resolution VIII.16), and on impact assessment (Resolution VIII.9); and NOTING that the Resolutions on *The Ramsar Strategic Plan 2003-2008* (Resolution VIII.25), *Incentive measures as tools for achieving the wise use of wetlands* (Resolution VIII.23), *Guidelines for rendering the use of groundwater compatible with the conservation of wetlands* (Resolution VIII.40), and *Conservation, integrated management, and sustainable use of mangrove ecosystems and their resources* (Resolution VIII.32) are relevant for the preparation of guidelines on agriculture, wetlands and water resource management; and
18. AFFIRMING that this Resolution is intended to focus specifically on the relationship between agriculture and wetlands and is not in any way intended to be used to support agricultural policies that are inconsistent with trade-related agreements;

THE CONFERENCE OF THE CONTRACTING PARTIES

19. CALLS UPON Contracting Parties to ensure that management plans for Ramsar sites and other wetlands are developed within wider integrated catchment management approaches which duly acknowledge the need for appropriate implementation of agricultural practices and policies that are compatible with wetland conservation and sustainable use goals, and URGES Parties to identify and enhance positive incentives for the conservation and sustainable use of wetlands, including sustainable agricultural systems related to these wetlands;
20. FURTHER URGES the Contracting Parties when reviewing land tenure policies to consider, where appropriate, wetland tenure systems and user rights in a manner that promotes fair, transparent and sustainable management of wetlands and their resources;
21. URGES Contracting Parties, when reviewing their agricultural policies, to identify possible subsidies or incentives that may be having negative impacts on water resources in general and on wetlands in particular, in their territories and/or elsewhere in the world, consistent with their other international rights and obligations, and to remove or replace them by incentives that would contribute to wetland conservation;
22. INVITES Contracting Parties that have not yet done so to initiate intra- and inter-ministerial dialogues including, as appropriate, institutions represented in Ramsar/National Wetland Committees where these have been established, with a view to enhancing integration of relevant policies related to the conservation of water resources, wetlands, and biodiversity;
23. REQUESTS Contracting Parties, when implementing this Resolution, to ensure that the activities and support measures indicated in paragraph 21 should not support agricultural policies that are inconsistent with trade-related agreements;
24. INVITES the International Organization Partners (IOPs) to the Convention, in close cooperation with the Ramsar Bureau, to work with other relevant bodies, in particular the Food and Agriculture Organization of the United Nations (FAO), to expand upon current reviews of the state of knowledge concerning the interactions between agricultural practices and wetland functions and values;
25. REQUESTS the Scientific and Technical Review Panel (STRP), working in cooperation with relevant international organizations and drawing on the review requested from the IOPs, to:
    a) establish a framework for identifying, documenting and disseminating good agriculture–related practice, including site-specific and crop-specific information, and policies that demonstrate sustainable use of wetlands for agriculture; and
    b) use this framework to develop for consideration at COP9, and possible incorporation into the site-management guidelines annexed to Resolution VIII.14, wetland-type specific management guidelines to
        - enhance the positive role that sustainable agricultural practices may have vis-à-vis the conservation and wise use of wetlands;
        - minimize the adverse impacts of agricultural practices on wetland conservation and sustainable use goals; and
        - include examples based on wetland-type specific needs and priorities that take into account the variety of agricultural systems;
26. INVITES the National STRP Focal Points to provide Contracting Parties' input for the preparation of the review and concise guidelines called for in the preceding paragraph;
27. REQUESTS the Ramsar Bureau, with the support of Contracting Parties and IOPs, to identify agriculture–related management practices developed for areas that include Ramsar sites, to contribute this information to the preparation of the

guidelines as requested in paragraph 25 above, and to share it with the Secretariats of CBD and the Convention to Combat Desertification (CCD);

28. FURTHER REQUESTS the STRP to ensure that adequate consideration of agriculture and wetland issues is incorporated into other relevant areas of work that the STRP may be dealing with, including global climate change, groundwater and its interaction with surface water, toxic chemicals, and desertification, as a contribution in the latter case to the implementation of the Memorandum of Cooperation between Ramsar and CCD;
29. FURTHER REQUESTS the Ramsar Bureau to ensure that the corresponding information generated by the implementation of this resolution, once approved at COP9, will be incorporated in future updates of the Ramsar Wise Use Handbooks and to work closely with the CBD Secretariat to incorporate appropriate joint actions derived from the content of this Resolution in the next review of their Joint Work Plan;
30. FURTHER REQUESTS the Secretary General to seek Ramsar representation in the Dialogue on Water, Food and the Environment and to build on existing links with that Dialogue's secretariat; and
31. INVITES Contracting Parties, IOPs, STRP members and National Focal Points, and others to contribute information on wetlands and agriculture to the Wise Use Resource Centre maintained by the Ramsar Bureau, to the activities of the River Basin Initiative and to the Dialogue on Water, Food and Environment and future meetings of the World Water Forum.

Annex 2
Checklist format

CHECKLIST FOR WA/WUR ANALYSIS OF CASE STUDIES REVISED FORMAT

Name		
Type of wetland Type of agriculture	Development situation Ramsar region	
ELEMENTS OF DPSIR MODEL	**NATURE OF ELEMENT**	**COMMENT**
DRIVERS		
Natural or human-induced forces that affect a wetland and wetland-related agricultural system, such as population growth, economic development or climate change (direct and indirect drivers, superficial and deep drivers)		
PRESSURES		
Stresses (positive or negative) on a wetland and wetland-related agricultural systems, resulting from the drivers		
STATE		
Changes in the quantity and quality of various environmental media (soil, water, air, etc) in wetlands and wetland-related agricultural system, resulting from the pressures		
ECOSYSTEM REGULATING SERVICES ➢ Water storage ➢ Groundwater recharge ➢ Groundwater discharg ➢ Flood contro ➢ Sediment retention function ➢ Nutrient retention ➢ Biological diversity ➢ Storm protection ➢ Microclimate stabilization		
IMPACTS		
The socio-economic consequences of state changes SOCIO-ECONOMIC PRODUCTS ➢ Forest resources ➢ Wildlife resources ➢ Fisheries ➢ Forage resources ➢ Agricultural resources ➢ Water transport ➢ Recreation/tourism		
ATTRIBUTES ➢ Uniqueness to culture		
RESPONSE		
The actions taken for dealing with those impacts (and their results) By 4 areas of DPSIR addressed: drivers, pressures, state change, impacts		
ISSUES		

Annex 3
Coding for database

Grouping for DPSIR elements in database		
Code		
D	Drivers	
	Driver details	Driver category
1.1	population growth	natural resource dynamics – population dynamics & land/food shortages
1.2	population concentration	
1.3	in-migration	
1.4	land shortages	
1.5	food shortage	
1.6	increasing food demand (not due to markets, see 2)	
1.7	animal population growth	
2.1	global non-local	markets
2.2	local market	
3.1	land tenure changes	land-use policies
3.2	conservation	
3.3	flood area creation	
3.4	environment policies/forestry	
4.1	subsidies	market & process policies
4.2	tariffs	
4.3	market incentives	
5.1	poor governance	government / community behaviour
5.2	government policies (not in above)	
6.1	climate change	natural environmental processes
6.2	upland degradation (only “natural” erosion)	
7.1	urbanization	
7.2	hydropower needs and development	
7.3	tourism	
8.1	technology introduction	
P	**Pressures**	
	Pressure details	**Pressure category**
1.1	colonization	expansion of agriculture
1.2	transforming natural vegetation	(crop, fish, livestock, productive forestry)
1.3	clearing	

Code	Grouping for DPSIR elements in database	
2.1	increased cropping intensity	agricultural intensification
2.2	intensification of fisheries	
2.3	intensification of aquaculture	
2.4	intensification of grazing	
2.5	crop and chemical intensification	
2.6	intensified gathering	
3.1	expansion of parks/gazetting	increasing nature conservation
3.2	designation of flood protection areas	
3.3	designation of drinking-water area	
3.4	formalization of environmental flows	
3.5	extensification of agriculture (including land abandoning)	
4.1	surface water extraction	water resources management and use
4.2	ground water extraction	
4.3	drainage (& land settlement)	
4.4	water storage facilities	(includes dams)
4.5	water conveyance infrastructure	(altering natural streams)
4.6	fresh & salt water inflow/outflow	(coastal areas and lagoons)
4.7	flood regime management	(timing and quantity)
5.1	pollution	others
5.2	fire	

	State changes	
S	**State change details**	**State change categories**
1.1	longer flooding, more flooding, waterlogging	water resources (base), quantity and timing
1.2	shorter flooding	
1.3	lower floods, lower flows, smaller flooded area	
1.4	higher floods, higher flows, larger area flooded	
1.5	faster water flow – reduced flood control capacity	
1.6	slower water flow – increased flood control capacity	
1.7	reduced groundwater recharge	
1.8	increased groundwater recharge	
1.9	lower water table in wetland	
1.10	higher water table in wetland / waterlogging	
1.11	reduced water storage in wetland	
1.12	increased water storage in wetland	(including pond creation / inundation)
1.13	drying up of reservoirs	
1.14	drying up of coastal lagoons	
1.15	increased hydrological variability	
1.16	moderation of seasonal variability of water regime	

	Grouping for DPSIR elements in database	
Code		
2.1	eutrophication	water quality & pollution
2.2	water pollution / (agricultural) waste	
2.3	increased freshwater level in lagoon	
2.4	increased salinity (mostly in lagoon – also through irrigation)	
2.5	water quality lowered	
3.1	sediment deposition / buildup in wetland	soils, changes in physical character
3.2	reduced infiltration (compacted soils)	
3.3	peat soil subsidence / increased susceptibility to fire	
3.4	eroded soils	
3.5	gullying / gully erosion	
3.6	reduced sediment retention capacity	
3.7	increased sediment retention capacity	
3.8	physical deterioration	
4.1	soil toxicity	soils, changes in chemical character
4.2	soil salinity	
4.3	less fertile soils	
4.4	acid soils	
4.5	more fertile soils	
5.1	increased vegetation, biodiversity, ground cover	loss or gain in biodiversity and species, or habitats
5.2	decreased vegetation, biodiversity, ground cover	
5.3	increased presence of invasive species	
5.4	less wildlife	
5.5	more fish	
5.6	less fish	
5.7	more wildlife	
6.1	changes in channel morphology, bank collapse, etc.	other
6.2	microclimate change	

I	**Impacts**	
	Impact details	**Impact categories**
1.1	rice / starches, maize, millet, sorghum, wheat, etc.	economic/livelihood gains from market-oriented agriculture
1.2	vegetables	
1.3	flowers	
1.4	sugar	
1.5	aquaculture	
1.6	other cash crops – cotton, groundnuts	

Grouping for DPSIR elements in database		
Code		
2.1	Sugar	commoditization of agriculture (company-based)
2.2	flowers	
2.3	aquaculture	
2.4	oil & biofuels	
2.5	wood products	
3.1	crop production – increased	food and nutrition gains/losses in (subsistence) uses
3.2	fisheries (capture) – increased	
3.3	livestock and grazing – increased	
3.4	natural gathering – including wildlife and products – increased	(including wood)
3.5	agroforestry – increased	
3.6	crop production – decreased	
3.7	fisheries (capture) – decreased	
3.8	livestock and grazing - decreased	
3.9	natural gathering – including wildlife and products – decreased	
3.10	agroforestry – decreased	
4.1	flood protection	increases in opportunity costs (lost capacity)
4.2	water purification	
4.3	recreation opportunities decreased	(including tourism)
4.4	negative cultural impacts	
5.1	flood protection	averted investment costs (enhanced capacity)
5.2	water purification	
5.3	recreation opportunities increased	(including tourism)
5.4	water regulation	
6.1	increase/decrease in economic differentiation	socio-economic differentiation & conflicts
6.2	increase/decrease in conflicts	
6.3	marginalization & poverty	
7.1	decreased disease occurrence	health
7.2	increased disease occurrence	
8		other
8.1	institutional / social capital development / changes	
8.2	water transport improved or impacts	
8.3	economic diversification	
8.4	land tenure & societal changes & business changes to add	

Grouping for DPSIR elements in database	
Code	
9	treaties
9.1	treaty obligations met
9.2	treaty obligations not met

	Responses
1	Actors
1.1	government
1.2	local NGOs
1.3	community
1.4	international agencies
1.5	international NGOs

2	Action
2.1	policy
2.2	technical measures
2.3	institutional development – government
2.4	planning
2.5	monitoring
2.6	institutional development – community
2.7	conservation / tourism development
2.9	more development & no responses to issues

3	**DPSIR element addressed**
3.1	drivers
3.2	pressures
3.3	state changes
3.4	impacts
3.5	other

Annex 4
List of case studies

Country & Ramsar region	Development situation	Wetland site	Reference/source
Asia			
Bangladesh	LIC	Sundarban coastal mangroves	**Gopal, B. & Chauhan, M.** 2006. Biodiversity and its conservation in the Sundarban Mangrove ecosystem. *Aq. Sci*., 69: 338–354. **Iftekhar, M.S.** 2006. Conservation and management of the Bangladesh coastal ecosystem; overview of an integrated approach. *Nat. Res. For*., 20: 230–237. **Islam, M.A. & Wahab, M.A.** 2005. A review on the present status and management of mangrove wetland habitat resources in Bangladesh with emphasis on mangrove fisheries and aquaculture. *Hydrobiologia*, 542: 165–190.
Bangladesh	LIC	Coastal mangroves	**Spalding, M., Blasco, F. & Field, C.** 1997. *World mangrove atlas*. Okinawa, Japan, International Society for Mangrove Ecosystems.
Bangladesh	LIC	Deltaic floodplains of Ganges, Brahmaputra & Meghna rivers	**Ahmed, R., Haque, M.R. & Khan, M.S.I**. 2004. *Introduction to community-based hoar and floodplain resource management*. Dhaka, IUCN Bangladesh Country Office. **Dey, M.M. & Prein, M.** 2004. *Community based fish culture in seasonally flooded rice fields in Bangladesh and Vietnam*. Paper presented at New directions for a diverse planet: proceedings of the 4th International Crop Science Congress, 26 September – 1 October 2004, Brisbane, Australia. **Islam, M. & Braden, J.B.** 2006. Bio-economic development of floodplains: farming versus fishing in Bangladesh. *Env. Dev. Econ*., 11: 95–126. **IRN**. *Rivers and dams in Bangladesh* (available at http://www.irn.org).
Cambodia	LIC	Floodplains & marshes – general paper	**Torell, M, Salamanca, A.M. & Ratner, B.D, eds.** 2004. *Wetlands management in Cambodia: socioeconomic, ecological, and policy perspectives*. Penang, Malaysia, WorldFish Center.
China	LMC	Ruoergai Plateau, peatlands	E-mail text source from Wetlands International staff in China
India	LIC	Punjab, incl. Harike	**Ladhar, S.S.** 2002. Status of ecological health of wetlands in Punjab, India. *Aq. Ecosys. Health Man*., 5(4): 457–465 (also available at http://www.punjabenvironment.com).
India	LIC	Chilika Lagoon, Orissa	**Pattnaik, A.** 2005. *The restoration of the Chilika Lagoon, a coastal wetland in India: the achievement of combined integrated water resources management and enhanced community participation.* Cases study for the FAO/Netherlands conference on water for food and ecosystems (available at http://www.fao.org).
India	LIC	Bhoj Upper Lake, Bhopal	http://www.environmental-incentives.org/, Winrock International.
India	LIC	Lake Kolleru	**Amaraneni, S.R.** 2006. Distribution of pesticides, PAHs and heavy metals in prawn ponds near Kolleru Lake wetland, India. *Env. Int*., 32: 294–302. **Rao, P.M. & Sekhar, P.** (n.d.) *A note on the ecological disturbance of Kolleru Lake of Andhra Pradesh*. (unpublished) **N.A.** 2007. *Operation Koleru restoration*.
India	LIC	Wular & associated wetlands, Jhelum River basin, Jammu & Kashmir	Unpublished paper, Wetlands International.
Indonesia	LMC	Air Hitam Laut River Basin	Checklist from J. van den Berg, WUR.

Country & Ramsar region	Development situation	Wetland site	Reference/source
Iraq	LMC	Marsh of Iraq	**Richardson, C., Reiss, P., Hussain, N.A., Alwash, A.J. & Pool, D.J.** 2005. The restoration potential of the Mesopotamian marshes of Iraq. *Science*, 307: 1307–1311.
			Richardson, C. & Hussain, N.A. 2006. Restoring the Garden of Eden: an ecological assessment of the marshes of Iraq. *BioScience*, 56(6): 477–489.
Lao People's Democratic Republic	LIC	Rainfed and irrigated rice, & aquaculture	**Huxley, T.H.** 2000. *Impacts of irrigation and aquaculture development on small-scale aquatic resources*. Final Report to the Department for International Development Environment Research Programme. London, Imperial College.
			Lorenzen, K., Choulamany, X. & Sultana, P. 2003. *Understanding livelihoods dependent on inland fisheries: Lao country report*. Penang, Malaysia, WorldFish Center.
			Nguyen Khoa, N., Lorenzen, K., Garaway, C., Chamsinhg, B., Siebert, D. & Randone, M. 2005. Impacts of irrigation on fisheries in rain-fed rice-farming landscapes. *J. Appl. Ecol*., 42(5): 892–900.
Malaysia	UMC	Maludam, Sarawak	**Berg, J. van den, Salleh, N., Demies, M. & Amir, J.** 2004. *Rapid diagnostic appraisal of non timber forest products of the Maludam National Park Betong Division Sarawak*. Sarawak, Malaysia, Forest Department. Joint Working Group Malaysia – the Netherlands: development and management of Maludam National Park.
Myanmar	LIC	Lake Inle	**Akaishi, F., Satake, M., Otaki, M. & Tominaga, N.** 2006. Surface water quality and information about the environment surrounding Inle Lake in Myanmar. *Limnology*, 7: 57–62.
			Sidle, R.C., Ziegler, A.D. & Vogler, J.B. 2007. Contemporary changes in open water surface area of Lake Inle, Myanmar. *Sus. Sci*., 2: 55–65.
Philippines	LMC	Mangroves in general	**Primavera, J.H.** 1995 Mangroves and brackishwater pond culture in the Philippines. *Hydrobiologia*, 295: 303–309.
SE Asia	LIC	Aquatic systems	**Amilhat, E., Morales, E.J., Immink, A.J., Little, D.C., Lorenzen, K., Islam, F., Karapanagiotidis, I.** 2005. *Self-recruiting species (SRS) from farmer managed aquatic systems: their role in rural livelihoods*. DFID Summary report (available at http://www.dfid.stir.ac.uk).
Sri Lanka	LMC	Embilikala, Malala & Bundala wetland lagoon system	**Bakker, M. & Matsuno, Y.** 2001. A framework for valuing ecological services of irrigation water: a case of an irrigation-wetland system in Sri Lanka. *Irri. Drain. Sys*., 15: 99–115.
			Piyankarage, S.C., Mallawatantri, A.P., Matsuno, Y. & Pathiratne, K.A.S. 2004. Human impacts and the status of water quality in the Bundala RAMSAR wetland lagoon system in Southern Sri Lanka. *Wetl. Ecol. Man*., 12: 473–482.
Sri Lanka	LMC	Kirindi Oya Irrigation Scheme	**Meinzen-Dick, R. & Bakker, M.** 1999. Irrigation systems as multiple-use commons: water use in Kirindi Oya, Sri Lanka. *Agric. Hum. Val*., 16: 281–293.
			Asian Development Bank. 2000. *Project performance audit report on the Kirindi Oya Irrigation and Settlement Project in Sri Lanka* (available at http://www.adb.org).
Thailand	LMC	Songkhram River basin	**Blake, D. & Friend, R. *et al*., ex GVH.** *Local wisdom for river basin management: Thai Baan research in the Sognkhram River basin*. FAO / Netherlands Conf.
			Blake, D.J.H. 2006. *The Songkhram River wetlands – a critical floodplain ecosystem of the lower Mekong basin*. Paper for 9th International River Symposium, 2006, Brisbane, Australia. (available at www.riversymposium.com).
			Blake, D.J.H. & Pitakthepsombut, R. 2006. *Situation analysis: lower Songkhram River basin, Thailand*. Bangkok, Mekong Wetlands Biodiversity Conservation and Sustainable Use Programme. 121 pp. (available at http://www.mekongwetlands.org).
			Promphakping, P., Pakdee P. & Pholsen, S. 2005. *Scoping study of irrigated agriculture in the lower Songkhram River basin, Thailand demonstration site. MWBP*. Report submitted to the Mekong Wetlands Biodiversity Conservation and Sustainable Use Programme, Vientiane. July 2005. (unpublished)
Viet Nam	LIC	Mekong Delta	"The Mekong River Delta: effective water control for solving conflicts among agriculture–fisheries–aquaculture in coastal zones" FAO/Netherlands e-forum.
			E-mails, R. Friend (IUCN), and Chu Thai Hoanh (IWMI).
Viet Nam	LIC	Huong River Basin, Phu Vang District	**Halsema, G. van.** *Water for food and ecosystem issues in the Huong River Basin – examples from Phu Vang District*. Mission report

Country & Ramsar region	Development situation	Wetland site	Reference/source
Europe			
Central Europe	UMC	Peatlands	**Bragg, O. & Lindsay, R.** (n.d) *Strategy and action plan for mire and peatland conservation in Central Europe*. Publication 18. Wageningen, Netherlands, Wetlands International.
Croatia	UMC	Sava floodplains	**Zingstra, H.** 2005. *Integrated river basin management of the River Sava*. Wageningen, Netherlands, Wageningen International.
			Project documents for "Protection of Biodiversity of the Sava River Basin Floodplains" carried out by IUCN European Office in partnership with Wageningen International.(2007–09)
Czech Republic	UMC	Trebon fish ponds	www.ramsar.org/wn/w.n.czech_echydrological2007.htm
Lithuania	UMC	Rusne Island, Nemunas River delta	**Vaiciunaite, R.** 2003. Managing the landscape for wetlands, biodiversity and agriculture in Lithuania. *Int. J. Ecol. Env. Sci*., 29: 89–92.
Lithuania	UMC	Lake Zuvintas	**Zingstra, H. *et al.*** 2006. *Management and restoration of Natura 2000 sites in the Dovine Basin. A pilot project for the combined implementation of the EU Water Framework Directive and the EU Birds and Habitats Directives*. Wageningen International.
Netherlands	HIC	Floodplains	G. van Halsema / Hans Langeveld, WUR.
Netherlands	HIC	Drentse Aa riverine wetlands	A. Schrevel, WUR.
Netherlands	HIC	Peatlands, Ranstad	A. Schrevel, WUR.
Poland	UMC	Biebrza River valley	H. Zingstra, WUR
Ukraine (Crimea)	LMC	Lake Sivash	Wetlands International communication.
United Kingdom	HIC	Great Fen	**Bowley, A.** 2007. The great Fen – a waterland for the future. *Brit. Wild*., 18(6): 415–423.
Neotropics & Mexico			
Argentina	UMC	Cordoba / Pampas wetlands	R. Jongman, WUR.
Brazil	LMC	Pantanal wetlands	**Jongman, R.H.G. & Padovani, C.R.** 2006. Integrating stakeholder knowledge and science for river basin management. *Int. J. Wat. Res. Man*., 49–63.
			Jongman, R.H.G., ed. 2006. *Pantanal-Taquari, tools for decision making in integrated water management*. Final report. Alterra Report 1295. 215 pp.
Brazil	LMC	Lower Campos River delta	R. Jongman, WUR.
Brazil	UMC	Central Amazon floodplain	**Junk, W.J., Ohly, J.J., Piedade, M.T.F. & Soares, M.G.M.** 2000. *The central Amazon floodplain: actual use and options for sustainable management*. Leiden, Netherlands, Backhuys Publishers.
Colombia	LMC	Fequene Lake	www.fundacionhumedales.org & e-mails from G.I. Andrade & L. Franco Vidal.
Ecuador	LMC	Mangroves, Esmeraldas Prov.	**Ocampo-Thomason, P.** 2006. Mangroves, people and cockles: impacts of the shrimp-farming industry on mangrove communities in Esmeraldas Province, Ecuador. *In* C.T. Hoanh, T.P. Tuong, J.W. Gowing & B. Hardy, eds. *Environment and livelihoods in tropical coastal zones*, pp. 140–153. Wallingford, UK, CAB International.
Mexico	UMC	Chinampa	**Crossley, P.** 1998. Sub-irrigation in wetland agriculture. *Agric. Hum. Val*., 21: 195–204.
			Losada, H., Martinez, H., Vieyra, J., Pealing, R., Zavala, R. & Cortes, J. 1998. Urban agriculture in the metropolitan zone of Mexico City: changes over time in urban, suburban and peri-urban areas. *Env. Urb*., 10(2): 37–54.
			Jimenez-Osornio, J.J. & Gomez-Pompa, A. 1991 Human role in shaping of the flora in a wetland community, the chinampa. *Land. Urb. Plan*., 20: 47–51.
Mexico	UMC	Yucatan	**Smardon, R.C.** 2006. Heritage values and functions of wetlands in southern Mexico. *Land. Urb. Plan*., 74: 296–312.
Peru	LMC	Lake Titicaca	**Erickson, C.L.** 1988. Raised field agriculture in the Lake Titicaca basin. *Expedition*, 30(1): 8–16.

Country & Ramsar region	Development situation	Wetland site	Reference/source
Venezuela	UMC	Merida Andes, Paramo, farmlands	**Monasterio, M., Smith, J.K. & Molinillo, M.** 2006. Agricultural development and biodiversity conservation in the Paramo environments on the Andes of Merida, Venezuela. *In* E. Spehn, M. Liberman & C. Korner, C., eds. *Land use changes and mountain biodiversity*, pp. 307–318. Boca Raton, USA, CRC Press. **Llambi, L.D.** 2005. Participatory planning for biodiversity conservation in the high tropical Andes: are farmers interested? *Mount. Res. Dev.*, 25(3): 200–205. **Molinillo, M. & Monasterio, M.** 1997. Pastoralism in Paramo environments: practices, forage and impact on vegetation in the Cordillera of Merida, Venezuela. *Mount. Res. Dev.*, 17(3): 197–211.
Venezuela	UMC	Merida Andes, Paramo, grazing lands (similar in Peru, Ecuador & Colombia)	As above.
North America			
Canada,	HIC	British Columbia, Georgia Basin	**Ducks Unlimited Canada.** 2006. *Fact Sheet 11 Natural values: linking the environment to the economy: agriculture and the environment*. **Ducks Unlimited Canada.** (n.d.) *Key habitat conservation priority: Georgia Basin. Wetlands for tomorrow*.
Canada	HIC	Manitoba, Lizard Marsh	**Coley, R.** (n.d.) *The role of sustainable development in protecting and enhancing wetland habitats*. (mimeo)
Canada	HIC	New Brunswick, Canaan-Washadem-oak	**Canaan Washademoak Watershed Association.** (n.d.) *Living with the land. (Issues 1–4 Who we are, community characteristics, land use, the riparian zone.)*
Canada	HIC	South Saskatchewan River Project	South Saskatchewan River Project - www.swa.ca/WaterManagement/DamsAndReservoirs **Alberta Environment.** 2003. *South Saskatchewan River Basin Water Management Plan, Phase Two: background studies*.
United States of America	HIC	Deschutes River basin, Oregon	http://www.deschutesriver.org/ **DRC.** 2006. *Instream flow in the Deschutes basin: monitoring, status and restoration needs* (available at www.ci.bend.or.us). **Shelton, M.L.** 1981. Runoff and land use in the Deschutes basin. *Ann. Ass. Am. Geog.*, 71(1): 11–27.
United States of America	HIC	Seepage wetlands and bog turtles, PA	E- mail communication – J. Thorne via Royal Gardner
United States of America	HIC	Prairie potholes	**Mulhouse, J.M. & Galatowitsch, S.M.** 2003. Revegetation of prairie pothole wetlands in the mid-continental US: twelve years post-reflooding. *Plant Ecol.*, 169: 143–159. **Euliss, N.H. & Mushet, D.M.** 1996. Water-level fluctuations in wetlands as a function of landscape condition in the Prairie pothole region. *Wetlands*, 16(4): 587–593. **Heimlich, R.E., Wiebe, K.D., Claassen, R., Gadsby, D. & House, R.M.** 1998. *Wetlands and agriculture: private interests and public benefits*. Agricultural Economic Report No. 765. USDA. **Valk, A.G. van der & Pederson, R.L.** 2003. The SWANCC decision and its implications for prairie potholes. *Wetlands*, 23(3) 590–596.
United States of America	HIC	California, Central Valley	**Richter, B.D. & Thomas, G.A.** 2007. Restoring environmental flows by modifying dam operations. *Ecol. Soc.*, 12(1): 12.
United States of America	HIC	California, Gulf and Mississippi, rice cultivation	**Bird, J.A. *et al.*** 2002. Long-term studies find benefits, challenges in alternative rice straw management. *Cal. Agric.*, (March–April): 69–75. **Fasola, M. & Ruiz, X.** 1996. The value of rice fields as substitutes for natural wetlands for waterbirds in the Mediterranean region. *Col. Waterbirds*, 19: 122–128. **Lawler, S.P.** 2002. Rice fields as temporary wetland: a review. *Isr. Sci. J.*, 47(4): 513–528.

Country & Ramsar region	Development situation	Wetland site	Reference/source
Oceania			
Australia	HIC	Lower Murumbidgee floodplain	**Kingsford, R.T.** 2003. Ecological impacts and institutional and economic drivers for water resource development – a case study of the Murrumbidgee River, Australia. *Aq. Ecosys. Health Man*., 6(1): 69–79.
			Murrumbidgee Catchment Management Authority. 2003 Catchment Action Plan (available at http://www.murrumbidgee.cma.nsw.gov.au).
Australia	HIC	Burdekin River floodplain	**Lukacs, G.** 1995. Wetlands of the lower Burdekin region, north Queensland. *In* Finlayson, C.M. ed. *Wetland research in the wet-dry tropics of Australia*. Barton, Australia.
Australia	HIC	Lower Gwydir	http://www.dnr.nsw.gov.au/water/wetlands_area_gwydir.shtml
Australia	HIC	Mangroves, Pioneer River. Queensland	**Hacker, J.L.F.** 1988. Rapid accumulation of fluvially derived sands and gravels in a tropical macrotidal estuary: the Pioneer River at MacKay, North Queensland, Australia. *Sed. Geol*., 57: 299–315.
			Jupiter, S.D. & Phinn, S.R. 2006. *Natural and anthropogenic changes to mangrove distribution in the Pioneer River estuary, Queensland, Australia*.
Australia	HIC	Murray River	**Nias, D.J., Alexander, P. & Herring, M.** 2003. Watering private property wetlands in the Murray Valley, New South Wales. *Ecol. Man. Res*., 4(1): 5–12.
Micronesia	LMC	Forested wetland, Kosrae	**Drew, W., Ewel, K.C., Naylor, R.L. & Sigrah, A.** 2005. A tropical freshwater wetland: III. Direct use values and other goods and services. *Wetl. Ecol. Man.*, 13: 685–693.
New Zealand	HIC	Lake Ellesmere (Waihora)	**Dept. of Conservation.** 2005. *Te Waihora joint management plan*. Department of Conservation and Te Runanga o Ngai Tahu.
			www.wet.org.nz
			http://www.doc.govt.nz/templates/page.aspx?id=35302
New Zealand	HIC	Waituna Lagoon	**Johnson, P.N. & Partridge, T.R.** 1998. *Vegetation and water level regime at Waituna Lagoon, Southland*. Science for Conservation No. 98. Wellington, Department of Conservation.
			Thompson, R.M. & Ryder, G.R. 2003. Waituna Lagoon: summary of existing knowledge and identification of knowledge gaps. Science for Conservation No. 215. Wellington Department of Conservation.
Papua New Guinea	LIC	Huli wetland, Tari basin	**Ballard, C.** 2001. Wetland drainage and agricultural transformations in the Southern Highlands of Papua New Guinea. *Asia Pac. View*., 42(2/3): 287–304.
			Wood, A.W. 2002. The ecology of Huli subsistence agriculture. *Pap. N. Guin. Med. J*., 45: 15–43.
Samoa	LMC	Apia catchment & Lake Lanoto'o	Ramsar Regional Representative
Africa			
Botswana	UMC	Shoshing Hill	**Clayton, A. & Woodhouse, P.** 2000. Modernizing communal lands: evolving resource use in the Shoshong Hills, Botswana. *In* P. Woodhouse, H. Bernstein & D. Hulme. *African enclosures? The social dynamics of wetlands in drylands*, pp. 119–153. Oxford, UK, James Currey.
Botswana	UMC	Okavango Delta	**Breen, C.M., Quinn, N.W. & Mander, J.J., eds.** 1997. *Wetlands conservation and management in Southern Africa: challenges and opportunities*. Summary of the SADC Wetlands Conservation Survey Reports. Gland, Switzerland, IUCN.
			Mbaiwa, J.E. 2003. The socio-economic and environmental impacts of tourism development on the Okavango Delta, north-western Botswana. *J. Arid Env*., 54: 477–467.
			Turton, A.R., Brynard, P. & Meissner, R. 2002. *Four strategic policy issues for consideration by the Permanent Okavango River Basin Water Commission (Okacom)*. Paper presented at the 3rd WaterNet/Warfsa Symposium 'Water Demand Management for Sustainable Development', Dar es Salaam, 30–31 October 2002.
			Scudder, T., Manley, R.E., Coley, R.W., Davis, R.K., Green, J., Howard, G.W., Lawry, S.W., Martz, D., Rogers, P.P., Taylor, A.R.D., Turner, S.D., White, G.F. & Wright, E.P. 1993. *The IUCN Review of the Southern Okavango Integrated Water Development Project*. Gland, Switzerland, IUCN.
			Jansen, R. 2002. *The Okavango Delta Management Plan Project – application of an ecosystem-based planning approach*. Paper presented at the 17th Global Biodiversity Forum, Valencia, Spain, 15–17 November 2002.

Country & Ramsar region	Development situation	Wetland site	Reference/source
Burkina Faso	LIC	Bas-fonds in Sanmatenga	**Hottinga, F., Peters, H. & Zanen, S.** 1991. *Potentials of bas-fonds in agropastoral development in Sanmatenga, Burkina Faso*. Part 3b of 'Wetlands in Drylands: The Agroecology of Savanna Systems in Africa. London, IIED.
Ethiopia	LIC	Southwest Ethiopia Highland wetlands	**Dixon, A.B. & Wood, A.P.** 2003. Wetland cultivation and hydrological management in East Africa: matching community and hydrological needs through sustainable wetland use. *Nat. Res. For.*, 27(2): 117–129.
Ethiopia	LIC	Rift Valley	**Jansen, H. *et al.*** 2007. Land and water resources assessment in the Ethiopian Central Rift Valley. Wageningen, Netherlands, WUR.
Kenya	LIC	Lake Ol Bolossat	**Gichuki, C.** (n.d.) *Community-based wetland management in Africa: a case study of Lake Ol Bolossat, Kenya*. Case Study No. 3. Wetlands International.
Kenya	LIC	Kimana Swamp, Kajiado District	**Southgate, C. & Hulme, D.** 2000. Uncommon property: the scramble for wetland in southern Kenya. *In* P. Woodhouse, H. Bernstein & D. Hulme. 2000. *African enclosures? The social dynamics of wetlands in drylands*, pp. 73-117. Oxford, UK, James Currey.
Kenya	LIC	Lake Victoria Finger Ponds	**Kipkemboi, J., Dam, A.A. van, Ikiara, M.M. & Denny, P.** 2007. Integration of smallholder wetland aquaculture-agriculture system (fingerponds) into riparian farming systems on the shores of Lake Victoria, Kenya: socio-economic and livelihoods. *Geog. J.*, 173(3): 257–272. **Barbier, P., Kalimanzira, C. & Micha, J.-C.** 1985. L'amenagement de zones marecageuses en ecosystems agro-piscicoles. Le projet Kirarambogo au Rwanda 1980–1985. Namur, Belgium, FUCID. **Korn, M.** 1996. The dike-pond concept: sustainable agriculture and nutrient cycling in China. *Ambio*, 25: 6–12. **Micha, J.-C., Halen, H. & Rosado Couoh, J.-L.** 1992. Changing tropical marshlands into agro-pisciculture ecosystems. *In* E. Maltby, P. Dugan & J.C. Lefeuvre, eds. *Conservation and development: the sustainable use of wetland resources*, pp. 83–88. Gland, Switzerland, IUCN.
Madagascar	LIC	Lake Alaotora	**Bakoariniaina, L.N., Kusky, T. & Raharimahefa, T.** 2006. Disappearing Lake Alaotra: monitoring catastrophic erosion, waterway silting and land degradation hazards in Madagascar using Landsat imagery. *J. Afr. Earth Sci.*, 44: 241–252.
Malawi	LIC	Simlemba	**Wood, A.P.** 2005. *Sustainable wetland management for livelihood security*. Simlemba TA, Kasungu District, Malawi. An environmental and socio-economic impact & development assessment. Zeist, Netherlands, Wetland Action.
Malawi	LIC	Lake Chilwa	**Ferguson, A. & Mulwafu, W.O.** 2005. *Irrigation reform in Malawi: exploring critical land-water intersections*. Paper presented at the International Workshop on 'African Water Laws: Plural Legislative Frameworks for Rural Water Management in Africa.' Johannesburg, South Africa, 26–28 January 2005. **Government of Malawi.** 2004. *National Water Policy*. Lilongwe, Ministry of Water Development. **Kambewa, D.** 2004. *Patterns of access and use in wetlands: the Lake Chilwa basin*. Report prepared for Basis Collaborative Research Support Programme, Department of Agricultural and Applied Economics, University of Wisconsin-Madison, October 2004. **Mulwafu, W.O. & Nkhoma, B.G.** 2001. *The use and management of water in the Likangala irrigation scheme complex in Southern Malawi: some preliminary findings*. Paper presented at the Second WARFSA/WaterNet Symposium, 'Integrated Water Resources Management: Theory, Practice, Cases', Cape Town, South Africa, 30–31 October 2001. **Mulwafu, W., Chipeta, C., Chavula, G., Ferguson, A., Nkhoma, B.G. & Chilima, G.** 2002. *Water demand management in Malawi: problems and prospects for its promotion*. Paper presented at the Third WaterNet/Warfsa Symposium, 'Water Demand Management for Sustainable Development', Dar es Salaam, 30–31 October 2002. **Mulwafu, W.O.** 2003. *The use of domestic water supplies for productive purposes in the Lake Chilwa catchment area in Southern Malawi*. Paper presented at the International Symposium on Water, Poverty and Productive Uses of Water at the Household Level, Muldersdrift, South Africa, 21–23 January 2003.

Note: LIC = low income country; LMC = lower middle income country; UMC = upper middle income country; HIC = high income country.

Country & Ramsar region	Development situation	Wetland site	Reference/source
Mali	LIC	Sourou Valley	**Woodhouse, P., Trench, P. & Tessougue, M.D.M.** 2000. A very decentralized development: exploiting a new wetland in the Sourou Valley, Mali. *In* P. Woodhouse, H. Bernstein & D. Hulme. *African enclosures? The social dynamics of wetlands in drylands*, pp. 29–72. Oxford, UK, James Currey.
Mali	LIC	Inner Niger Delta	B. Kone, Wetland International
Nigeria	LIC	Fadama	**Saket, K., Hussini, S.M. & Dongs, I.S.** 2005. Economics of sustainable vegetable farming under fadama condition in Dass local government area, Bauchi State of Nigeria. *Econ. Aff.*, 50(1): 46–51.
			Kolawole, A., ed. 1994. *Strategies for the sustainable use of fadama lands in northern Nigeria*. Nigeria, Ahmadu Bello University.
			Kolawole, A. 1991. *Economics and management of fadama in northern Nigeria*. IIED Drylands Programme.
Nigeria	LIC	Hadeija-Nguru	**Hollis, G.E., Adams, W.M. & Aminu-Kano, M.** 1993. *The Hadejia-Nguru wetlands: environment, economy and sustainable development of a Sahelian floodplain wetland*. Gland, Switzerland, IUCN.
			Adams, W.M. & Hollis, G. 1987. *Hydrology and sustainable resource development of a Sahelian wetland, Hadejia-Nguru Wetlands Conservation Project*. Gland, Switzerland, IUCN.
			Schultz. 1976. Hadejia River basin study. Canadian International Development Agency. 8 volumes in an Interim and a Final Report. Cited in: W.M. Adams, Agriculture, grazing and forestry, *in* G.E. Hollis, W.M. Adams & M. Aminu-Kano. 1993. *The Hadejia-Nguru wetlands: environment, economy and sustainable development of a Sahelian floodplain wetland*, pp. 89–115. Gland, Switzerland, IUCN.
Sierra Leone	LIC	Inland valley swamps, Eastern Province	**Siera Agricultural and Technical Services.** 1996. *Inland Valley Swamp Study. Annex 5. Socio-economic Issues*. Freetown.
			Siera Agricultural and Technical Services. 1996. *Inland Valley Swamp Study. Annex 6. Health and environmental problems associated with swamp development*. Freetown.
			Mulema, J.P. 2000. *Evaluation of the plant diversity on the fringe and inland valley swamp topo-sequence for conservation and management*. Freetown: Department of Biological Sciences, Faculty of Environmental Science, Njala University College. (BSc thesis)
South Africa	UMC	Mutale River Valley	**Lahiff, E.** 2000. The Mutale River Valley: an apartheid oasis. *In* P. Woodhouse, H. Bernstein & D. Hulme. *African enclosures? The social dynamics of wetlands in drylands*, pp. 155–193. Oxford, UK, James Currey. pp. 155–193.
South Africa	UMC	Craigieburn wetland, Sand River	**Pollard, S.R. *et al.*** 2005. *Towards wetland and livelihood improvements: an integrated socio-ecological approach to the rehabilitation of a communal wetland in the north-eastern region of South Africa*. Paper presented at the WRPR Workshop of Wetlands International, St Lucia, South Africa.
Sudan	LIC	Wadis in north Kordofan	**El Sammani, M.O.** 1991. *Wadis of north Kordofan, Sudan – present roles and prospects for development*. Part 3c of Wetlands in Drylands: The Agroecology of Savanna Systems in Africa. London, IIED.
Uganda	LIC	Nakivubo, Kampala	**Tindamanyire, T.** 2003. Wetlands, water resources and agricultural productivity: an important synergy for biodiversity conservation. *Int. J. Ecol. Env. Sci.*, 29: 39–46.
Uganda	LIC	Yamariro wetland, Kabale	E-mail text, Ugandan NGO, Aventino Kasangaki
United Republic of Tanzania	LIC	Bahi wetlands	**Yanda, P.Z., Majule, E.K. & Mwakaje, A.G.** (n.d.) *Wetland utilisation, poverty alleviation and environmental conservation in semi arid areas of Tanzania – the case of Singida Region*. Unpublished paper. Institute of Resource Assessment, University of Dar es Salaam.
United Republic of Tanzania	LIC	Usangu basin, Ruaha River	**Lankford, B.** 2004. Resource-centred thinking in river basins: should we revoke the crop water approach to irrigation planning? *Agric. Wat. Man.*, 68(1): 33–46.
Zambia	LIC	Dambos, Mpika District	**Sampa, J.** 2007. *Dambo cultivation*. Mpika, NLWCCDP.

Note: LIC = low income country; LMC = lower middle income country; UMC = upper middle income country; HIC = high income country.

Country & Ramsar region	Development situation	Wetland site	Reference/source
Zambia	LIC	Barotse floodplain, Western Province	**Wood, A.P.** 1985. A century of development measures and population redistribution along the upper Zambezi. *In* J.I. Clarke, M. Khogali & L.A. Kosinski, eds. *Population and development schemes in Africa*, pp. l63–175. Cambridge, UK, Cambridge University Press. **Kokwe, M.** 1991. *The role of dambos in agricultural development*. Part 3e of Wetlands in Drylands: The Agroecology of Savanna Systems in Africa. IIED, London.

Note: LIC = low income country; LMC = lower middle income country; UMC = upper middle income country; HIC = high income country.

Annex 5
Tables of individual DPSI elements

TABLE A5.1
Drivers by region (as % of case sample size)

Gr.	Driver	All	Africa	Asia	Eur	Neotr	N Am	Ocea
	Sample size (no.)	92	25	23	11	13	10	10
1	Pop. growth	53%	76%	74%	18%	54%	10%	30%
1	Pop. conc.	5%	12%	4%	0%	0%	0%	10%
1	In-migration	14%	36%	9%	0%	0%	0%	20%
1	Land shortages	15%	36%	22%	0%	0%	0%	0%
1	Food shortage	14%	40%	13%	0%	0%	0%	0%
1	Increased food demand	8%	28%	0%	0%	0%	0%	0%
1	Animal population	9%	16%	4%	0%	8%	10%	10%
2	Global markets	43%	12%	43%	55%	54%	80%	60%
2	Local markets	49%	56%	48%	45%	62%	20%	50%
3	Land tenure	5%	12%	9%	0%	0%	0%	0%
3	Conservation	1%	0%	0%	0%	0%	10%	0%
3	Flood areas	1%	0%	4%	0%	0%	0%	0%
3	Land alienation	2%	4%	0%	0%	0%	0%	10%
4	Subsidies	9%	0%	13%	27%	0%	10%	10%
4	Market incentives	2%	0%	0%	0%	8%	0%	10%
5	Poor governance	3%	0%	4%	0%	15%	0%	0%
5	Government policies	48%	56%	52%	73%	31%	40%	20%
6	Climate change/variability	12%	32%	0%	18%	8%	0%	0%
7	Urbanization	20%	36%	17%	18%	23%	0%	0%
7	Hydropower	1%	4%	0%	0%	0%	0%	0%
7	Tourism	4%	4%	0%	0%	0%	30%	0%
8	Technology	7%	12%	0%	0%	23%	0%	0%
8	New crops	1%	4%	0%	0%	0%	0%	0%

TABLE A5.2
Drivers by wetland type

	Driver	All	Inl. flowing	Inl. still perm	Inl. seas	Peat	Saline	Brackish	Human-made
	Sample size (no.)	154	27	39	33	15	10	10	20
1	Pop. growth	52%	44%	59%	42%	67%	30%	40%	70%
1	Pop. conc.	6%	7%	8%	9%	0%	10%	0%	5%
1	In-migration	13%	11%	21%	15%	7%	0%	20%	5%
1	Land shortages	14%	7%	21%	12%	7%	20%	10%	15%
1	Food shortage	14%	19%	10%	21%	0%	0%	10%	25%
1	Incr. food demand	6%	4%	10%	9%	0%	0%	0%	10%
1	Animal population	6%	11%	8%	6%	13%	0%	0%	0%
2	Global markets	46%	41%	33%	52%	47%	90%	60%	40%
2	Local markets	50%	52%	46%	58%	40%	40%	60%	50%
3	Land tenure	5%	4%	8%	3%	0%	10%	0%	10%
3	Conservation	1%	0%	3%	0%	0%	0%	0%	0%
3	Flood area creation	1%	0%	0%	0%	0%	10%	0%	0%
3	Land alienation	3%	4%	5%	3%	0%	0%	0%	0%
4	Subsidies	9%	11%	8%	9%	7%	10%	10%	10%
4	Market incentives	3%	4%	3%	3%	0%	0%	10%	0%
5	Poor governance	4%	0%	3%	3%	0%	30%	0%	5%
5	Government policies	53%	56%	54%	58%	40%	40%	40%	65%
6	Climate change	9%	11%	15%	12%	7%	0%	0%	0%
7	Urbanization	19%	19%	18%	21%	7%	30%	20%	20%
7	Hydropower	1%	0%	0%	3%	0%	0%	0%	5%
7	Tourism	3%	11%	5%	0%	0%	0%	0%	0%
8	Technology	7%	7%	8%	12%	13%	0%	0%	0%
8	New crops	2%	4%	0%	6%	0%	0%	0%	0%

TABLE A5.3
Pressures by region

	Pressure	All	Africa	Asia	Eur	Neotr	N Am	Ocea
1	Colonization	54%	68%	39%	36%	77%	40%	60%
1	Transformation of vegetation	46%	60%	30%	27%	69%	50%	30%
1	Clearing	9%	12%	9%	0%	8%	10%	10%
2	Increased crop intensity	51%	56%	61%	36%	69%	10%	50%
2	Intens. fisheries	5%	16%	4%	0%	0%	0%	0%
2	Aquaculture growth	7%	0%	22%	0%	8%	0%	0%
2	Intensf. grazing	18%	36%	4%	9%	23%	10%	20%
2	Chemical intensf.	14%	0%	17%	27%	15%	10%	30%
2	Gathering growth	8%	8%	13%	0%	15%	0%	0%
2	Tree planting	2%	4%	0%	9%	0%	0%	0%
2	Extraction of NR	1%	0%	0%	9%	0%	0%	0%
3	Agr. extensif.	4%	0%	4%	27%	0%	0%	0%
4	Surface water extr.	21%	28%	13%	0%	15%	30%	40%
4	Ground water extraction	10%	20%	0%	0%	0%	20%	20%
4	Drainage (& land settlement)	38%	40%	35%	45%	38%	40%	30%
4	Water storage facilities	15%	24%	13%	9%	8%	10%	20%
4	Infrastructure water	12%	4%	22%	9%	0%	10%	30%
4	Freshwater & saltwater inflow/ outflow	4%	0%	17%	0%	0%	0%	0%
4	Flood regime management	5%	8%	13%	0%	0%	0%	0%
5	Pollution	10%	8%	9%	27%	15%	0%	0%
5	Fire	2%	8%	0%	0%	0%	0%	0%
5	Increased runoff in catchment	1%	0%	0%	9%	0%	0%	0%
5	Geomorphological changes, e.g. breaching lagoon, bank collapse	1%	0%	0%	0%	0%	0%	10%

TABLE A5.4
Pressures by wetland type

	Pressure	All	Inl. flowing	Inl. still perm	Inl. seas	Peat	Saline	Brackish	Human-made
1	Colonization	53%	56%	56%	64%	60%	50%	30%	35%
1	Transformation of vegetation	46%	56%	44%	61%	40%	70%	30%	15%
1	Clearing	11%	11%	13%	18%	7%	0%	10%	5%
2	Increased crop intensity	51%	52%	54%	58%	40%	50%	60%	40%
2	Intens. fisheries	5%	11%	5%	0%	0%	0%	0%	10%
2	Aquaculture growth	7%	4%	3%	3%	0%	30%	10%	20%
2	Intensf. grazing	17%	26%	21%	24%	7%	0%	20%	0%
2	Chemical intensf.	18%	26%	18%	21%	0%	10%	30%	10%
2	Gathering growth	6%	4%	8%	3%	13%	10%	10%	5%
3	Agr. extensif.	4%	4%	5%	3%	13%	0%	0%	0%
4	Surface water extr.	22%	33%	21%	24%	0%	10%	30%	25%
4	Groundwater extraction	8%	15%	5%	15%	0%	0%	10%	5%
4	Drainage (& land settlement)	37%	22%	46%	33%	87%	40%	30%	10%
4	Water storage facilities	17%	26%	3%	27%	0%	10%	20%	30%
4	Infrastructure water	16%	22%	8%	18%	7%	10%	10%	30%
4	Freshwater & saltwater inflow/outflow	5%	0%	0%	0%	0%	10%	40%	10%
4	Flood regime management	7%	15%	5%	6%	0%	20%	0%	5%
5	Pollution	11%	11%	18%	9%	7%	0%	20%	5%
5	Fire	1%	4%	3%	0%	0%	0%	0%	0%
5	Increased runoff in catchment	1%	4%	0%	3%	0%	0%	0%	0%
2	Tree planting	2%	0%	3%	3%	7%	0%	0%	0%
5	Geomorphological changes	1%	0%	0%	0%	0%	0%	10%	0%
2	Gravel extraction	1%	0%	3%	0%	7%	0%	0%	0%

TABLE A5.5
State changes by region

	State change	Total	Africa	Asia	Eur	Neotr	N Am	Ocea
100	Longer flooding, more flooding, waterlogging	9%	8%	13%	9%	0%	10%	10%
110	Higher water table in wetland / waterlogging	11%	12%	17%	9%	0%	0%	20%
120	Reduced water storage in wetland	11%	12%	22%	9%	0%	0%	10%
125	Increased water storage in wetland	5%	4%	13%	9%	0%	0%	0%
130	Drying up of reservoirs	1%	0%	4%	0%	0%	0%	0%
135	Drying up of coastal lagoons	1%	0%	0%	0%	8%	0%	0%
140	Increased hydrological variability	14%	12%	26%	0%	0%	30%	10%
145	Moderation of seasonal variability of water regime	3%	0%	0%	0%	8%	10%	10%
150	Drying up of swamps	1%	0%	4%	0%	0%	0%	0%
160	Shorter flooding	7%	4%	4%	0%	15%	10%	10%
165	Lower floods, lower flows, smaller flooded area	22%	24%	26%	0%	23%	20%	30%
170	Higher floods, higher flows, larger area flooded	10%	16%	9%	9%	8%	10%	0%
175	Faster water flow – reduced flood control capacity	3%	4%	9%	0%	0%	0%	0%
180	Reduced groundwater recharge	5%	16%	0%	9%	0%	0%	0%
185	Increased groundwater recharge	2%	0%	0%	9%	0%	0%	10%
190	Lower water table in wetland	33%	52%	22%	27%	31%	40%	10%
200	Eutrophication	13%	4%	17%	27%	8%	10%	20%
210	Water pollution / (agricultural) waste	24%	8%	26%	55%	38%	10%	20%
220	Increased freshwater level in lagoon	5%	0%	17%	9%	0%	0%	0%
230	Increased salinity (lagoon & irrigation)	4%	0%	13%	9%	0%	0%	0%
240	Water quality lowered	13%	12%	13%	0%	8%	30%	20%
300	Sediment deposition / build up in wetland	27%	36%	26%	0%	23%	20%	50%
310	Reduced infiltration (compacted soils)	9%	28%	0%	0%	0%	10%	0%
320	Peat soil subsidence / increased susceptibility to fire	9%	4%	9%	36%	8%	0%	0%
330	Eroded soils	4%	12%	0%	0%	0%	0%	10%
340	Gullying / gully erosion	10%	28%	4%	0%	8%	0%	0%
350	Physical deterioration	9%	24%	4%	0%	8%	0%	0%
400	Soil toxicity	2%	4%	4%	0%	0%	0%	0%
410	Soil salinity	7%	8%	9%	0%	0%	0%	20%
420	Less fertile soils	13%	36%	13%	0%	0%	0%	0%
430	Acid soils	2%	4%	0%	0%	8%	0%	0%
440	More fertile soils	4%	12%	0%	0%	0%	0%	10%
500	Increased vegetation, biodiversity, ground cover	5%	4%	4%	9%	0%	0%	20%
600	Decreased vegetation, biodiversity, ground cover	71%	72%	61%	91%	69%	70%	70%
610	Increased presence of invasive species	13%	16%	13%	9%	8%	0%	30%
620	Less wildlife	13%	8%	17%	9%	15%	10%	20%
630	Less fish	11%	12%	17%	0%	15%	0%	10%
640	Loss of human maintained biodiversity	3%	0%	0%	27%	0%	0%	0%
700	Changes in channel morphology, bank collapse, etc.	5%	0%	9%	0%	8%	0%	20%

TABLE A5.6
Impacts by region

	Impact	All	Africa	Asia	Europe	Neo-tropics	N. America	Oceania
100	Cereals	41%	60%	43%	18%	15%	70%	20%
110	Vegetables	26%	44%	4%	18%	23%	40%	30%
120	Sugars	2%	0%	0%	0%	8%	0%	10%
140	Cash crops	8%	8%	0%	9%	8%	0%	30%
130	Aquaculture	11%	4%	30%	9%	8%	0%	0%
220	Com. aquaculture	1%	0%	0%	9%	0%	0%	0%
200	Com. livestock	11%	0%	4%	27%	8%	40%	10%
210	Flowers	1%	4%	0%	0%	0%	0%	0%
230	Oil & biofuels	1%	0%	4%	0%	0%	0%	0%
235	Company-based agriculture	2%	4%	0%	0%	0%	10%	0%
300	Incr. crop prod.	36%	72%	39%	0%	23%	0%	30%
310	Fisheries increased	2%	0%	9%	0%	0%	0%	0%
320	Incr. livestock	2%	0%	4%	0%	0%	0%	10%
330	Incr. gathering	3%	8%	4%	0%	0%	0%	0%
400	Decr. aquaculture	1%	0%	4%	0%	0%	0%	0%
410	Decr. crop prod.	16%	24%	26%	18%	8%	0%	0%
420	Decr. fisheries	30%	32%	74%	0%	15%	0%	10%
430	Decr. livestock	16%	36%	9%	36%	0%	0%	0%
440	Decr. gathering	17%	24%	26%	9%	15%	0%	10%
500	Flood protection	4%	0%	9%	9%	0%	10%	0%
510	Water purification	2%	0%	4%	0%	8%	0%	0%
520	Recreation	14%	4%	13%	27%	8%	20%	30%
530	Negative cultural impacts	8%	0%	0%	45%	8%	0%	10%
600	Water purification	1%	4%	0%	0%	0%	0%	0%
605	Increased flood protection	1%	0%	0%	0%	0%	0%	10%
610	Recreation opportunities increased	8%	4%	9%	9%	0%	30%	0%
620	Water regulation	1%	0%	4%	0%	0%	0%	0%
700	economic differentiation	17%	48%	9%	0%	8%	0%	10%
710	Increase / decrease in conflicts	23%	32%	30%	9%	38%	0%	0%
720	Marginalization & poverty	13%	16%	22%	9%	15%	0%	0%
730	Poverty reducing	1%	4%	0%	0%	0%	0%	0%
800	Increased disease occurrence	4%	8%	9%	0%	0%	0%	0%
810	Institutional / social capital devt / changes	3%	8%	4%	0%	0%	0%	0%
820	Water transport improved of impacts	2%	4%	0%	0%	8%	0%	0%
830	Economic diversification	3%	12%	0%	0%	0%	0%	0%
840	Land tenure changes	1%	4%	0%	0%	0%	0%	0%
845	HEP	1%	4%	0%	0%	0%	0%	0%
850	Treaty obligations met	2%	0%	0%	18%	0%	0%	0%