

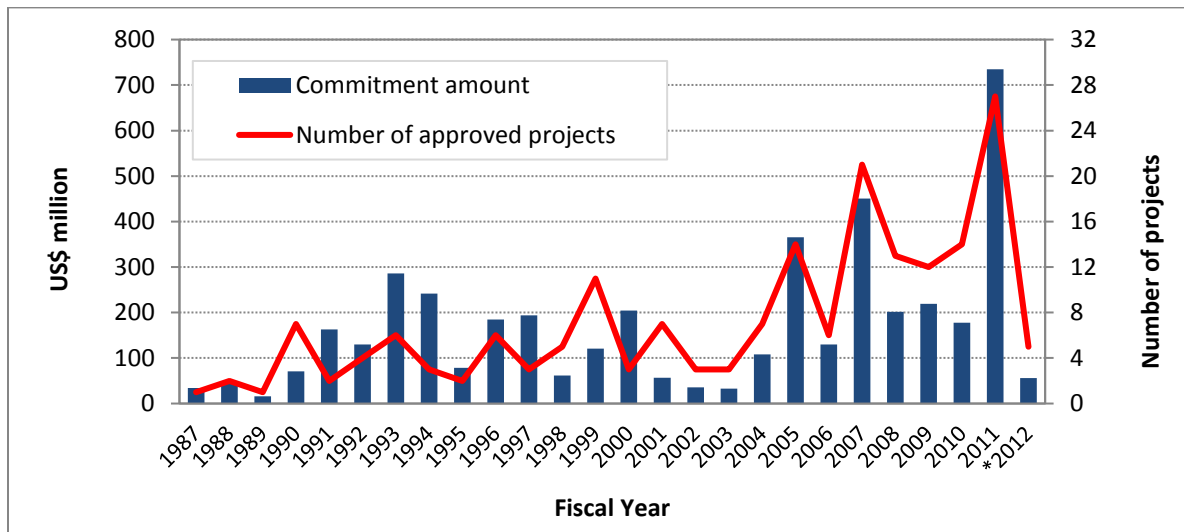
A REVIEW OF FLOOD PROTECTION INVESTMENT PROJECTS FINANCED BY THE WORLD BANK

Prepared by the Water Resources and Watershed Management Thematic Group¹

World Bank Lending in Flood Protection

Between FY87 and end of calendar year 2011, the World Bank had approved 188 projects (only investment operations) that included at least one activity related to flood protection. Total funding for these projects, including IBRD loans, IDA credits and grants, amounted US\$14.3 billion, out of which direct World Bank support to flood protection was about US\$4.4 billion or 30 percent of overall commitments. Support for flood protected experienced the highest level ever in FY11, in term of both number of projects as well as commitment amounts (Figure 1). Bank financing participation for all flood protection activities is estimated at 49 percent of activities' costs.

Figure 1: Approved Flood Protection Projects by Fiscal Year



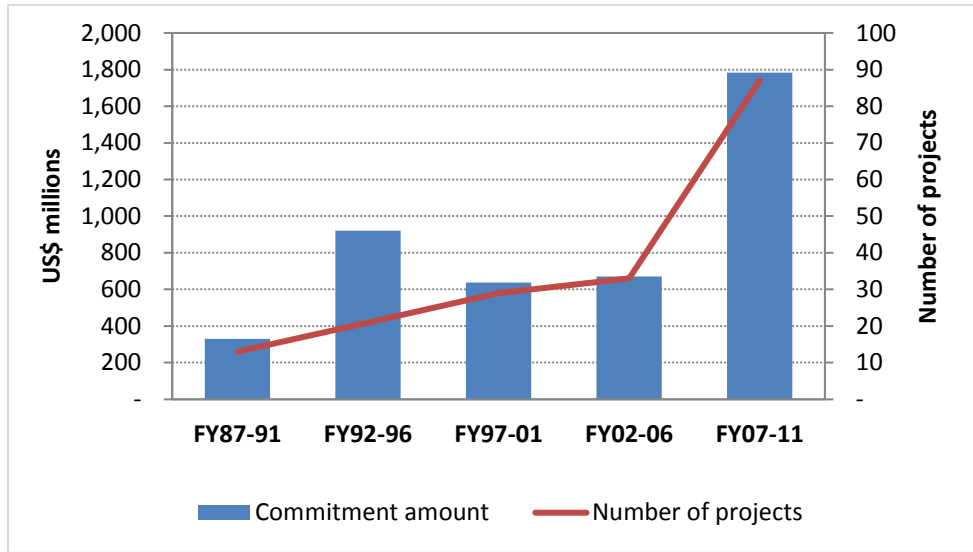
Source: Comprehensive database on flood protection projects prepared on the basis of the data contained in the Water Portal, accessed on January 6, 2012.

Note: * It only includes projects approved by end of calendar year 2011.

The flood protection portfolio is characterized by a sharp decline in commitments (in current prices) during the period FY01-03, reaching the lowest point (about US\$33 million) in FY03. The period FY07-11 saw an increase in commitments for flood protection and the number of projects presented to the Board more than any other previous quinquennium (Figure 2). The increase in commitment was driven by two large projects: the FY07 Odra River Basin Flood Protection Project in Poland (with US\$160 million commitment to flood protection) and the FY11 Padma Multipurpose Bridge Project in Bangladesh (with US\$324 million commitment to flood protection).

¹ Prepared at the request of Thematic Group members in January 2012. For additional information about this note and the database, please contact Rita Cestti, Rcestti@worldbank.org.

Figure 2: World Bank Support to Flood Protection by Quinquennium

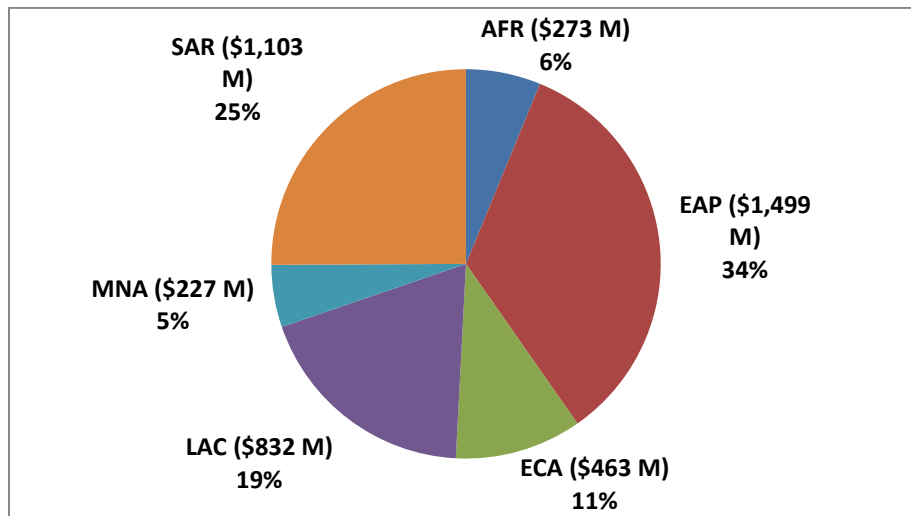


Source: Comprehensive database on flood protection projects prepared on the basis of the data contained in the Water Portal, accessed on January 6, 2012.

Regional Distribution of Flood Protection Commitments

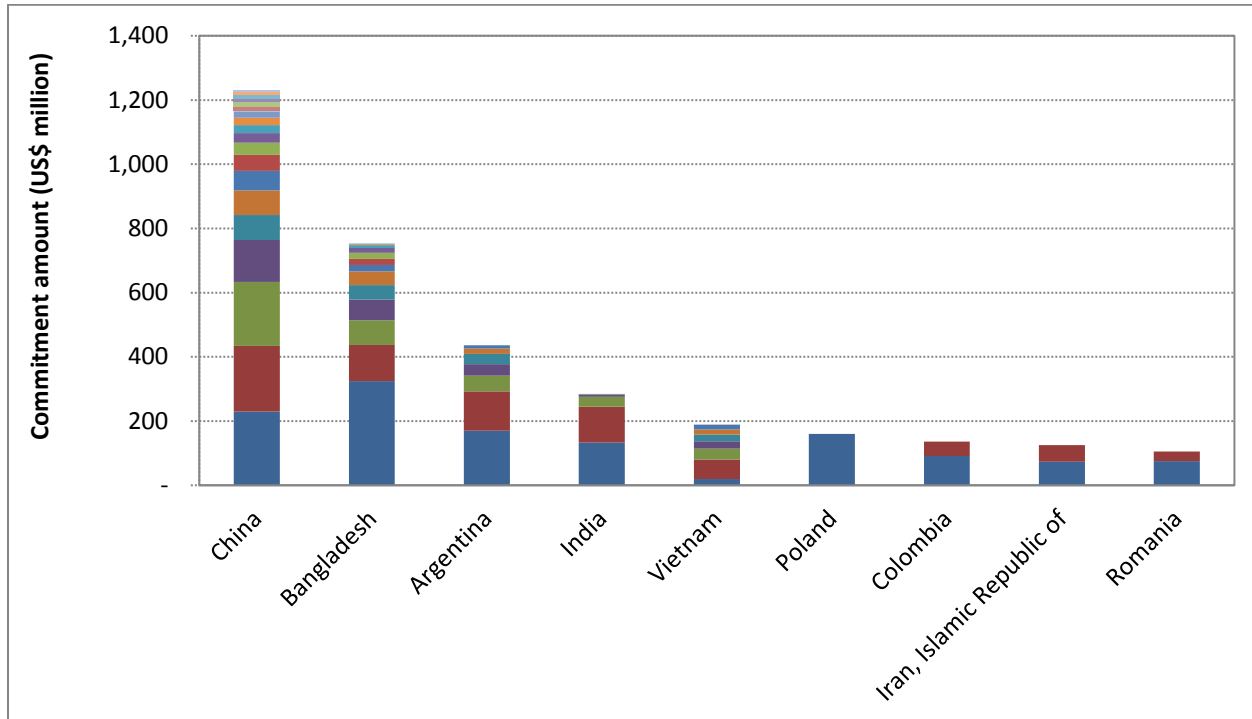
Overall Bank commitments for flood protection made between FY87 and end-December 2011 are dominated by projects in three regions: East Asia and Pacific with 34 percent of total commitment, South Asia with 25 percent and Latin America and Caribbean with 19 percent (Figure 3). A closer analysis indicates that 60 projects in 9 countries, led by China, account for nearly 80 percent of the overall Bank commitment for flood protection (Figure 4).

Figure 3: Overall Bank Commitments for Flood Protection by Region



Source: Comprehensive database on flood protection projects prepared on the basis of the data contained in the Water Portal, accessed on January 6, 2012.

Figure 4: Bank Commitments for Flood Protection by Country



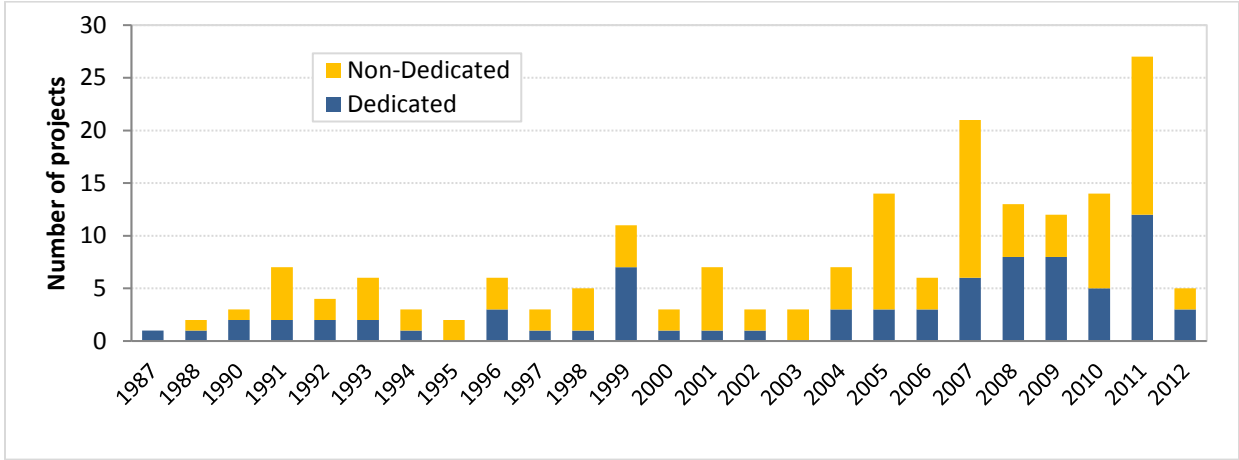
Source: Comprehensive database on flood protection projects prepared on the basis of the data contained in the Water Portal, accessed on January 6, 2012.

Note: It only accounts for 78 percent of the overall Bank commitment. It shows countries with more than US\$100 million commitments for flood protection. The various colors in the bars indicate commitments for flood protection by project. In the case of China for example, there are 19 projects supporting flood protection. In the case of Bangladesh, the number of projects amounts to 13.

Dedicated and Non-Dedicated Flood Protection Projects

Overall, the flood protection portfolio includes dedicated and non-dedicated flood protection projects. In this review, a dedicated flood protection project is defined as the one that meets the following two criteria: at least 40 percent of its commitment is allocated to flood protection; and the greatest proportion of its commitment is allocated to flood protection. Seventy seven projects or about 41 percent of the approved projects fit the definition of dedicated projects. The number of dedicated projects experienced a considerable increase from FY04 onwards, reaching the pick of 12 projects in FY11 (Figure 5).

Figure 5: Number of Dedicated and Non-Dedicated Approved Flood Protection Projects by Fiscal Year

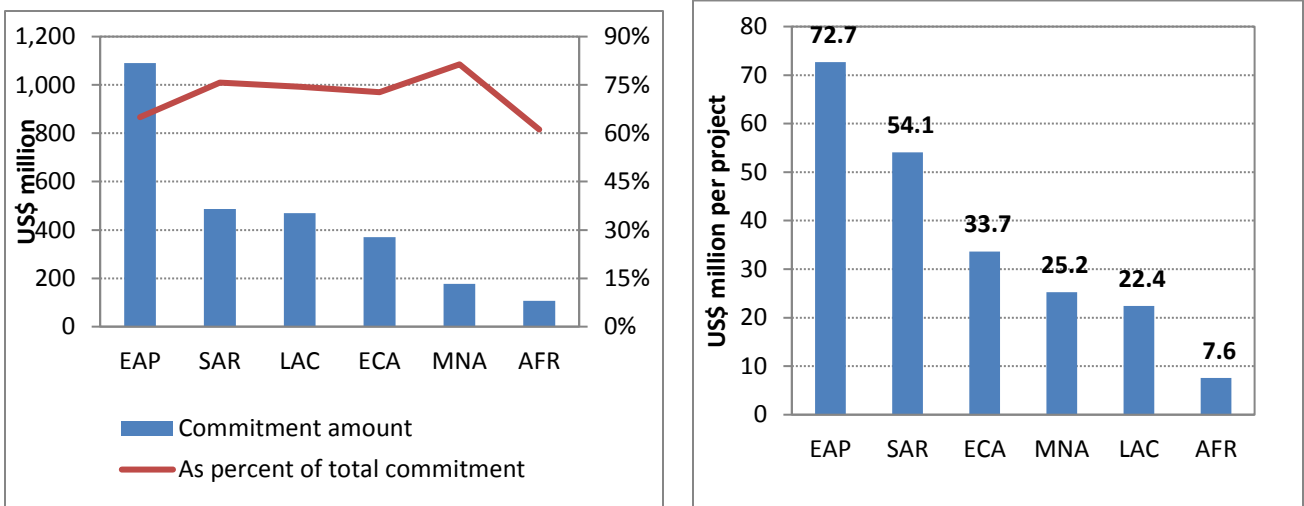


Source: Comprehensive database on flood protection projects prepared on the basis of the data contained in the Water Portal, accessed on January 6, 2012.

Regional Distribution of Approved Dedicated Flood Protection Projects

Data from approved dedicated flood protection projects approved between FY87 and end-December 2011 reveal that three-quarters of Bank commitment is concentrated in East Asia and Pacific, South Asia and Latin America and the Caribbean, with East Asia and the Pacific committing far more than any other region, about 40 percent or US\$1.1 billion. Support for flood protection under these dedicated projects represents 70 percent of overall Bank commitments. Bank financing participation in these projects is estimated at 45 percent of flood protection activities’ costs. Both East Asia and the Pacific Region and South Asia tend to lend more on average per project at US\$72.7 million and US\$54.1 million, respectively (Figure 6).

Figure 6: Total and Average World Bank Commitment in Dedicated Flood Protection Projects by Region

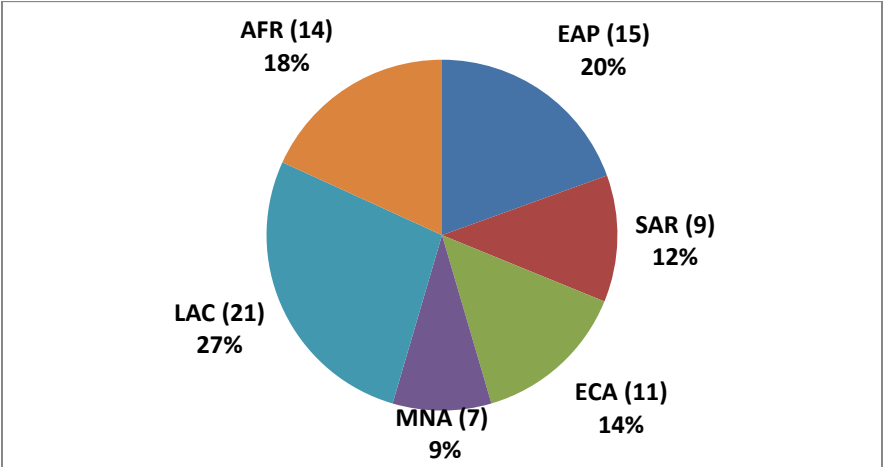


Source: Comprehensive database on flood protection projects prepared on the basis of the data contained in the Water Portal, accessed on January 6, 2012.

The region with the largest number of dedicated (and approved) flood protection projects is Latin American and Caribbean (21), follow-up by East Asian and Pacific (15) and Africa (14) (Figure 7). China has the largest number of dedicated projects (7). Twenty-three dedicated projects in China (7), Bangladesh (6), Argentina (4), Poland (1), India (3) and Iran (2) account for more than three-quarters of the World Bank commitments for flood protection (Table 1).

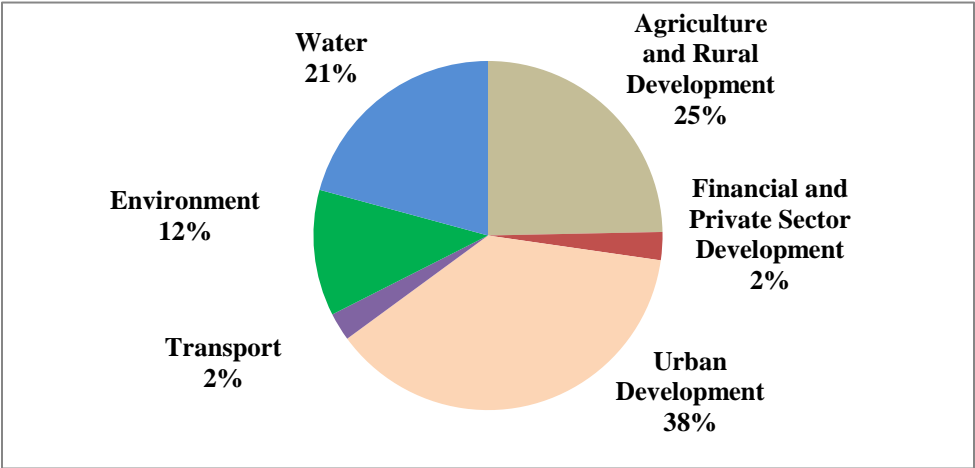
The dedicated flood protection projects approved between FY87 and end-calendar year 2011 are spread over 6 Sector Boards. The Urban Sector Board oversees more dedicated flood protection projects (38 percent) than any other sector board, which represents 16 percent of the volume of commitments. It is followed by the Agriculture and Rural Development Sector Board, which oversees 25 percent of the projects and 40 percent of the commitments, and the Water Sector Board, which oversees 21 percent of the projects and 41 percent of the commitments (Figures 8 and 9).

Figure 7: Number of Dedicated Flood Protection Projects by Region



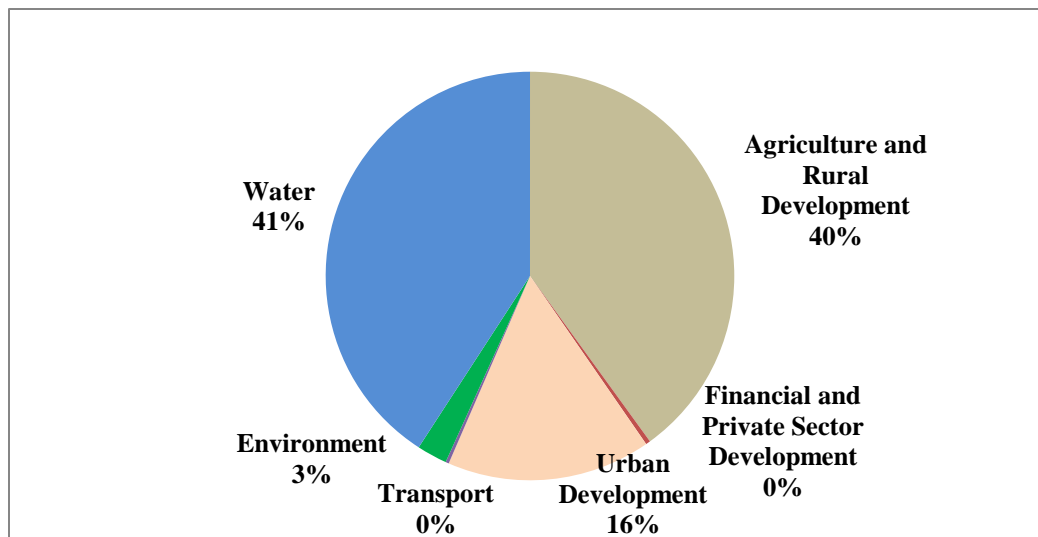
Source: Comprehensive database on flood protection projects prepared on the basis of the data contained in the Water Portal, accessed on January 6, 2012.

Figure 8: Number of Dedicated Flood Protection Projects by Sector Board



Source: Comprehensive database on flood protection projects prepared on the basis of the data contained in the Water Portal, accessed on January 6, 2012.

Figure 9: Volume of Commitment Dedicated Flood Protection Projects by Sector Board

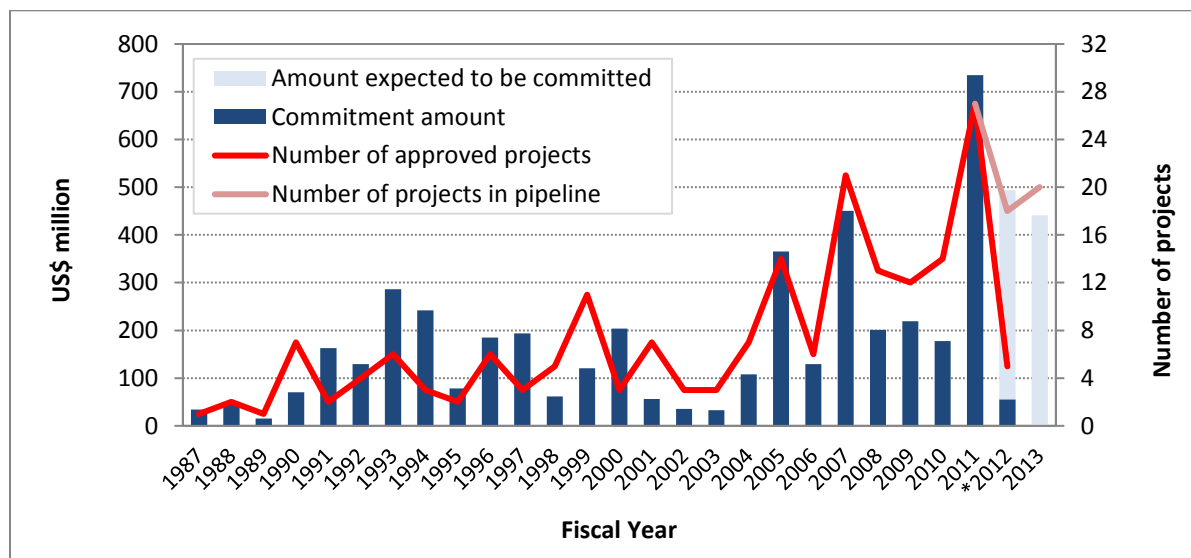


Source: Comprehensive database on flood protection projects prepared on the basis of the data contained in the Water Portal, accessed on January 6, 2012.

The Flood Protection Pipeline

The FY12-13 pipeline includes 33 projects with at least one activity related to flood protection, with a total expected funding of US\$1.8 billion. About 50 percent or US\$0.88 billion of World Bank commitments are expected to finance flood protection activities. Although number of projects and commitments for flood protection for FY12-13 are expected to be lower than those for FY11, lending prospects in flood protection are showing a substantial increase over the period FY08-10 (Figure 10).

Figure 10: Flood Protection Projects by Fiscal Year



Source: Comprehensive database on flood protection projects prepared on the basis of the data contained in the Water Portal, accessed on January 6, 2012.

More than half of these projects (17) are considered dedicated flood protection projects, and account for 86 percent or US\$0.76 billion of all expected commitments for flood protection. This represents 76 percent of expected commitments under the dedicated projects. The pipeline shows that 6 projects will go to the Board in FY12 and 11 in FY13 (Table 2). The Urban Sector Board is expected to oversee 53 percent of the dedicated flood protection projects and 66 percent of the commitments. This is followed by the Water Sector Board, which is expected to oversee 23 percent of the projects and 21 percent of the commitments.

Table 1: World Bank Approved Dedicated Flood Protection Projects Since FY87

Country	FY	Project Name	Total Cost US\$ million	Flood Protection Cost		World Bank Commitment (US\$ million)				
				%	US\$ million	IBRD	IDA	Grant	Total	For Flood Control
Africa										
Africa	2007	Eastern Nile Flood Prevention and Early Warning Project Phase 1	4.1	50	2.0	-	-	3.5	3.5	1.7
	2012	Strengthening ICPAC as a regional centre of excellence for disaster risk reduction	0.4	50	0.2	-	-	0.4	0.4	0.2
Benin	2008	Second Decentralized City Management Project - Additional Financing	46.6	70	32.6	-	40.0	-	40.0	28.0
Burkina Faso	2011	Maintreaming Disaster Reduction (GFDRR)	1.4	100	1.4	-	-	1.4	1.4	1.4
Central African Republic	2011	Emergency Urban Infrastructure Rehabilitation and Maintenance Project - Additional Financing	23.9	49	11.7	-	23.9	-	23.9	11.7
Ethiopia	2009	Flood Risks Prevention Project	0.3	100	0.3	-	-	0.3	0.3	0.3
Madagascar	1990	Antananarivo Plain Development	68.6	40	27.4	-	30.5	-	30.5	12.2
Mali	2011	Maintreaming Disaster Reduction (GFDRR)	1.4	100	1.4	-	-	1.4	1.4	1.4
Sao Tome and Principe	2011	Adaptation to Climate Change	4.1	80	3.3	-	-	4.2	4.2	3.3
Senegal	2012	Disaster Risk Management and Climate Change Adaptation Project	5.0	100	5.0	-	-	5.0	5.0	5.0
Seychelles	2008	National Disaster Preparedness and Response Project	2.4	50	1.2	-	-	0.9	0.9	0.5
Togo	2009	Emergency Infrastructure Rehabilitation and Energy Project	26.8	40	10.7	-	25.0	-	25.0	10.0
	2011	Emergency Infrastructure Rehabilitation and Energy Project - Additional Financing	15.0	86	12.9	-	15.0	-	15.0	12.9
Uganda	1999	Nakivubo Channel Rehabilitation Project	22.4	79	17.7	-	22.4	-	22.4	17.7
East Asia and Pacific										
China	2008	China Bengbu Integrated Environment Improvement Project	224.0	50	112.0	100.0	-	-	100.0	50.0
	2011	Huai River Basin Flood Management and Drainage Improvement	597.4	65	388.3	200.0	-	-	200.0	130.0
	2005	Hunan Urban Development Project	364.2	45	163.9	172.0	-	-	172.0	77.4
	1993	Taihu Basin Flood Control Project	497.3	100	497.3	100.0	100.0	-	200.0	200.0
	1994	Xiaolangdi Multipurpose Project	2,294.7	50	1,147.4	460.0	-	-	460.0	230.0
	2009	Xining Flood and Watershed Management	188.0	60	112.8	100.0	-	-	100.0	60.0
	2000	Yangtze Dike Strengthening Project	545.5	97	529.1	210.0	-	-	210.0	203.7
East Asia and Pacific	2011	Building Community Resilience in EAP (GFDRR)	0.2	50	0.1	-	-	0.2	0.2	0.1
Fiji	2010	Integrated Flood Management - Nadi Basin Pilot	1.4	80	1.1	-	-	0.8	0.8	0.7

Country	FY	Project Name	Total Cost US\$ million	Flood Protection Cost		World Bank Commitment (US\$ million)				
				%	US\$ million	IBRD	IDA	Grant	Total	For Flood Control
Indonesia	2006	Emergency Rehabilitation of Drainage and Flood Protection Systems in Banda Ache	4.5	80	3.6	-	-	4.5	4.5	3.6
	2009	TA for Jakarta Flood Mitigation	5.0	50	2.5	-	-	5.0	5.0	2.5
Malaysia	1987	Western Johore Agricultural Development Project (02)	148.3	62	91.9	55.0	-	-	55.0	34.1
Samoa	2004	Cyclone Emergency Recovery Project	6.0	75	4.5	-	4.5	-	4.5	3.4
Vietnam	2006	Natural Disaster Risk Management Project	102.5	70	71.8	-	86.0	-	86.0	60.2
	1999	Three Cities Sanitation Project	119.5	43	51.4	-	80.5	-	80.5	34.6
Europe and Central Asia										
Albania	2008	Disaster Risk Mitigation and Adaptation Project	10.2	43	4.4	3.0	6.2	-	9.2	3.9
Central Asia	2011	Central Asia Hydrometeorology Modernization Project	27.7	66	18.3	-	20.7	-	20.7	13.7
Croatia	1999	Kopacki Rit Wetlands Management Project	0.8	60	0.5	-	-	0.8	0.8	0.5
	1998	Reconstruction Project for Eastern Slavonia, Baranja and Western Srijem	50.0	68	34.0	40.6	-	-	40.6	27.6
Cyprus	1988	Southern Conveyor Project (02)	164.5	94	154.7	30.0	-	-	30.0	28.2
Georgia	2005	Irrigation and Drainage Community Development Project Additional Financing	16.1	65	10.5	-	13.0	-	13.0	8.5
Kyrgyz Republic	1999	Flood Emergency Project	14.1	69	9.7	-	10.0	-	10.0	6.9
	2011	Coordination of Emergency Situations	1.5	100	1.5	-	-	1.5	1.5	1.5
Poland	2007	Odra River Basin Flood Protection	489.0	87	425.4	184.0	-	-	184.0	160.1
Romania	2004	Hazard Risk Mitigation & Emergency Preparedness Project	196.7	50	98.3	150.0	-	-	150.0	75.0
Serbia	2007	Serbia Irrigation and Drainage Rehabilitation Project Additional Financing	62.5	90	56.3	49.4	-	-	49.4	44.4
Latin America and Caribbean										
Argentina	2006	Argentina - Urban Flood Prevention and Drainage APL 2	91.6	70	64.1	70.0	-	-	70.0	49.0
	1997	Flood Protection Project	420.0	85	357.0	200.0	-	-	200.0	170.0
	1993	Flood Rehabilitation Project	270.0	40	108.0	-	-	-	-	-
	2005	Urban Flood Prevention and Drainage APL1	190.0	94	178.6	130.0	-	-	130.0	122.2
Brazil	2009	BR Municipal APL: Sao Luis Enhancing Municipal Governance and Quality of Life Project	59.4	52	30.9	35.6	-	-	35.6	18.5
	2007	BR Municipal APL1: Uberaba	28.8	41	11.8	17.3	-	-	17.3	7.1
Central America	2011	Central America DRR & CCA Program	0.7	100	0.7	-	-	0.7	0.7	0.7
	2009	Central America Mitch +10 Report and Summit	0.2	100	0.2	-	-	0.2	0.2	0.2
Costa Rica	2011	Adaptive Natural Resources Management will Bolster Cabécar Communities	0.2	100	0.2	-	-	0.2	0.2	0.2

Country	FY	Project Name	Total Cost US\$ million	Flood Protection Cost		World Bank Commitment (US\$ million)				
				%	US\$ million	IBRD	IDA	Grant	Total	For Flood Control
	2010	Costa Rica Pilot on Early Warning Systems for Hydrometeorological Hazards	0.3	70	0.2	-	-	0.3	0.3	0.2
Dominica	1999	Dominica Emergency Recovery & Disaster Management Project	6.0	68	4.1	2.5	1.8	-	4.3	2.9
Ecuador	2008	Disaster Risk Reduction Program for the Municipalities of Quito	1.0	100	1.0	-	-	1.0	1.0	1.0
	1991	Guayas Flood Control	150.0	50	75.0	59.0	-	-	59.0	29.5
Grenada	2001	Emergency Recovery & Disaster Management Project	11.8	68	8.0	5.1	5.0	-	10.1	6.8
Guyana	2008	Conservancy Adaptation Project	5.0	97	4.9	-	-	3.8	3.8	3.7
Haiti	2012	Disaster Risk Management and Reconstruction	60.0	50	30.0	-	60.0	-	60.0	30.0
Jamaica	2010	Community-based Landslide Risk Reduction (JSDF Grant)	2.5	100	2.5	-	-	2.5	2.5	2.5
OECS Countries	2011	Regional Disaster Vulnerability Reduction APL1 - Grenada and St. Vincent and the Grenadines	53.1	68	36.1	-	20.9	-	20.9	14.2
St. Lucia	2009	Disaster Management Project II - Additional Financing	4.0	90	3.6	-	3.0	-	3.0	2.7
	2004	Disaster Management Project II	8.9	60	5.3	3.7	3.8	-	7.5	4.5
	1996	Watershed and Environmental Management Project	7.1	80	5.7	2.6	2.7	-	5.3	4.2
Middle East and North Africa										
Djibouti	2007	Flood Emergency Rehabilitation - Additional Grant	2.0	40	0.8	-	2.0	-	2.0	0.8
	2010	Natural Disaster Risk Assessment and Monitoring System	0.9	50	0.5	-	-	0.9	0.9	0.5
Iran, Islamic Republic of	1992	Sistan River Flood Works Rehabilitation Project	100.0	92	92.0	57.0	-	-	57.0	52.4
	1992	Tehran Drainage Project	95.6	95	90.8	77.0	-	-	77.0	73.2
Yemen, Republic of	1990	Taiz Flood Disaster Prevention & Municipal Development Project	28.8	40	11.5	-	15.0	-	15.0	6.0
	2002	Taiz Municipal Development and Flood Protection Project	50.0	74	37.0	-	45.2	-	45.2	33.4
	2008	Taiz Municipal Development and Flood Protection Project	22.1	52	11.5	-	20.0	-	20.0	10.4
South Asia										
Bangladesh	1996	Coastal Embankment Rehabilitation	87.8	85	74.6	-	53.0	-	53.0	45.1
	1999	Coastal Embankment Rehabilitation - Additional Financing	16.5	58	9.6	-	16.5	-	16.5	9.6
	2009	Dhaka Water Supply and Sanitation Project	165.7	51	84.5	-	149.0	-	149.0	76.0
	1999	River Bank Protection Project - Additional Financing	45.0	94	42.3	-	45.0	-	45.0	42.3
	1996	River Bank Protection Project	192.0	93	178.6	-	121.9	-	121.9	113.4
	2008	Water Management Improvement Project	136.7	64	87.5	-	102.3	-	102.3	65.4
India	2010	Bihar Flood Management Information System Phase II	1.5	100	1.5	-	-	1.5	1.5	1.5
	1991	Dam Safety Project	196.8	87	171.2	23.0	130.0	-	153.0	133.1
	2007	Bihar Flood Management (DFID)	0.6	100	0.6	-	-	0.6	0.6	0.6

Table 2: World Bank Dedicated Flood Protection Projects in the FY12-13 Pipeline

Country	FY	Project Name	Total Cost US\$ million	Flood Protection Cost		World Bank Commitment (US\$ million)				
				%	US\$ million	IBRD	IDA	Grant	Total	For Flood Control
Africa										
Senegal	2012	Stormwater Mgt. and Climate Change Adaptation Project	86.2	60	51.7	-	55.2	-	55.2	33.1
Togo	2012	Emergency Infrastructure Rehabilitation & Energy Project - Additional Financing	14.0	80	11.2	-	14.0	-	14.0	11.2
East Asia and Pacific										
China	2013	Guangxi Laibin Water and Environment	160.0	50	80.0	-	-	-	-	-
	2013	Ma'anshan Cihu River Basin Improvement Project	286.0	50	143.0	110.0	-	-	110.0	55.0
Indonesia	2012	Jakarta Urgent Flood Mitigation Project	189.9	100	189.9	139.6	-	-	139.6	139.6
Mongolia	2012	Improving Disaster Risk Management in Mongolia	2.7	50	1.4	-	-	2.7	2.7	1.4
Pacific Islands	2013	Integrated Flood Management: Pilot Project, Nadi, Fiji	-	100	-	-	-	-	-	-
Solomon Islands	2013	Increasing Resilience to Climate Change and Natural Hazards.	2.7	60	1.6	-	-	-	-	-
Vanuatu	2013	Mainstreaming Disaster Risk Reduction.	2.7	60	1.6	-	-	-	-	-
Europe and Central Asia										
Albania	2013	Water Resources and Irrigation Project	40.0	50	20.0	40.0	-	-	40.0	20.0
Kazakhstan	2013	Syr Darya Control and Northern Aral Sea Project - Phase II	325.8	40	130.3	165.8	-	-	165.8	66.3
Latin America and Caribbean										
Brazil	2013	BR Federal DRM Project	100.0	60	60.0	100.0	-	-	100.0	60.0
Colombia	2013	Barranquilla Urban Flood Management	250.0	100	250.0	150.0	-	-	150.0	150.0
Dominica	2013	Third Phase Disaster Vuln.Reduction APL for Dominica	15.0	50	7.5	-	-	-	-	-
OECS Countries	2013	Second Phase Disaster Vulnerability Reduction APL for St. Lucia	22.0	50	11.0	-	10.0	-	10.0	5.0
South Asia										
Sri Lanka	2012	Metro Colombo - Towards a Flood Resilient Urban Environment	1.2	100	1.2	-	-	-	-	-
	2012	Metro Colombo Urban Development Project	267.9	100	267.9	117.0	100.0	-	217.0	217.0