



1. Project Data

Project ID P086768	Project Name ODRA RIVER BASIN FLOOD PROT	
Country Poland	Practice Area(Lead) Water	
L/C/TF Number(s) IBRD-74360	Closing Date (Original) 30-Nov-2014	Total Project Cost (USD) 166,561,150.12
Bank Approval Date 21-Mar-2007	Closing Date (Actual) 30-Jun-2020	
	IBRD/IDA (USD)	Grants (USD)
Original Commitment	184,000,000.00	0.00
Revised Commitment	173,278,349.64	0.00
Actual	166,561,150.12	0.00

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2. Project Objectives and Components

a. Objectives

According to the Financing Agreement (FA, p. 19), and the Project Appraisal Document (PAD, paragraph 9) the Project Development Objective (PDO) was "to protect the population in the Odra River Basin (ORB) against loss of life and damage to property caused by severe flooding." The Project would protect more than 2.5 million people against flooding in Raciborz, Kedzierzyn, Kozle, Krapkowice, Opole, Brzeg, Olawa, and Wroclaw, and settlements in the three voivodships of Slaslue, Opolskie, and Dolnoslaslue along the ORB. A voivodship is the highest administrative division in Poland, equivalent to province in other countries.



This review will assess the project performance against this singular objective. The PDO would be achieved by: (i) reducing the extreme flood peaks by constructing a dry polder on the Odra River upstream of Raciborz town (a dry polder is a storage mechanism using machines to dry flood plain areas to better control the river system and reduce flood peak downstream of the reservoir), and (ii) increasing the flood carrying capacity of the Odra River channels through and around Wroclaw.

b. Were the project objectives/key associated outcome targets revised during implementation?
No

c. Will a split evaluation be undertaken?
No

d. Components

1. Construction of Raciborz Flood Retention Reservoir: (US\$ 218.3 at appraisal, US\$486.88 million actual). This component would finance the construction of a dry polder on the Odra River to store flood water, including right and left bank dikes or embankments along the Odra valley and a spillway structure. These structures would reduce the frequency and severity of future floods.

2. Modernization of Wroclaw Floodway System: (US\$253.9 million at appraisal, US\$383.7 million actual). This component would finance improvements to Odra dikes, strengthen and raise embankments, and construct retaining walls. In addition, the component would increase hydraulic capacity of the Odra River and widen and deepen channels for hydraulic related structures; increase design capacity of the existing Odra - Widawa diversion, and increase the capacity of the Widawa River channel by widening the flood plain, and reconstructing dikes and structures along the river.

3. Improving Flood Management, Monitoring & Evaluation (M&E), and Supervision of the Environmental Assessment (EA), Environmental Management Plan (EMP), and Resettlement Action Plan (RAP): (US\$ 26.6 million at appraisal from World Bank, and US\$14.74 million actual, all from the World Bank). This component would finance (i) the implementation of the RAP and resettlement of persons displaced by the construction of the dry polder and the modernization of the Wroclaw floodway system; (ii) the establishment of an Odra River Flood Management Center (OFMC) for the upper and middle Odra river basin to conduct flood forecasting, planning, emergency preparedness and crisis management; and (iii) the preparation of flood management and protection strategy. This component would also (i) improve and implement flood simulation models and prepare plans for operation and maintenance (O&M) of major flood storage reservoirs and other hydraulic infrastructure in the ORB; (ii) Improve flood forecasting systems, operational effectiveness of the system of hydro-met forecasting and flood protection and management plans; (iii) identify, rank, and conduct studies for priority projects, and (iv) monitor and evaluate project impact.

4. Project Management, Technical Assistance, and Training: (US\$5.2 million from the World Bank, and US\$6.25 million actual, all from the World Bank) This component would finance implementation support for the project PCU, including the preparation of a follow-on project, technical assistance, and institutional strengthening.



e. Comments on Project Cost, Financing, Borrower Contribution, and Dates

Project Cost: At appraisal, the total project cost was US\$489 million comprised of a World Bank loan (US\$184 million) and non-World Bank contributions (US\$ 305 million) including from the borrower. The Bank loan disbursed US\$166.56 million and the balance of the loan was cancelled.

Financing: At appraisal, the estimated total cost (US\$489 million) was to be financed by the International Bank for Reconstruction and Development (IBRD)(US\$184 million), the European Commission (EC, US\$130 million) and the Council of Europe Development Bank (CEB)(US\$145 million) and the borrower (US\$30.0 million see below). At project closing, the total actual project cost (US\$1,025.29 million) had the following actual disbursements (US\$1,018.57 million): the World Bank (US\$166.56 million), EC (US\$382.65 million) ECB (US\$229.96 million) and the borrower (US\$239.4 million). The balance of US\$6.72 million of the Bank loan was cancelled.

Borrower Contribution: At appraisal the borrower committed to contribute US\$30 million. At closing, the actual borrower contribution was US\$239.4 million to cover cost overruns (ICR, paragraph 51 and Table 3).

Dates: The project was approved on March 21, 2007 and made effective on July 9, 2007. The Mid Term Review (MTR) was conducted on September 26, 2011. The original closing date was November 30, 2014. The project was extended twice to close on June 30, 2020 after level 2 restructurings. There were four level 2 restructurings:

- On January 31, 2014 to make changes in disbursement arrangements and procurement provisions. These included:(a) increase the special account allocation, (b) reallocate loan proceeds among disbursement categories, (c) increase the share of expenditures to be financed, and (d) modify the procurement processes and thresholds. These changes would maintain timely payments to contractors. make better use of the different funding sources, and allow more flexibility for the remaining recruitments and small works.
- On July 10, 2014, to extend the loan closing date for the first time from November 30, 2014 to December 31, 2017 -- a three-year extension. EU accession, changes in the government, and the project's large and complex procurement packages and safeguard requirements resulted in procurement delays of the major civil works contracts. A three-year extension would allow for a one-year performance test period of the dry polder. At the time of this extension, 10 of 12 major contracts committed 90 percent of the total project cost.
- On October 20, 2017 to modify the results framework, extend the loan closing date a second time from December 31, 2017 to June 30, 2020--an extension of two and a half years, and adjust target completion dates. A dispute in the dry polder construction contract led to its cancellation and termination of the management contract in October 2016. A new contract was expected in December 2017. This 2017 contract required another two years to complete. The baseline and target values of indicators from the original Results Framework (PAD, Annex 1) were not monitored in Implementation Status and Results Reports (ISRs) and were reinstated (Restructuring Paper RES No. 29007).
- On February 16, 2018 to reallocate and use up all funding sources.

Split Rating: The PDO and outcome indicators remained the same until closing, hence a split rating is not required.



3. Relevance of Objectives

Rationale

Country Context: The PDO is highly relevant. The country's Odra River and its tributaries flood frequently. Records show four major floods in the 19th century and another 12 in the 20th century. The July 1997 floods caused by extremely heavy rains was four times that of the long-term average (PAD, paragraph 7). The 1997 devastation covered 650 km² of three voivodships of Slaski, Olpolskie, and Doinoslaskie; damaged 37,000 building; 866 bridges; over 2,000 km of roads; and destroyed 129 km of dikes. The floods caused damages estimated at US\$2.3 billion (PLN8.5 billion) with 54 lives lost, 700,000 homes flooded, and 110,000 residents evacuated (PAD, paragraph 7). The 1997 floods also magnified uncoordinated operations of the hydraulic structures resulting from damages to the monitoring, early warning, and communications systems. In line with its 2004 European Union accession, the country is complying with the requirements of the second cycle of the Floods Directive and in support of the new 6-year EU program called "Stop Floods" to support the development of flood risk management plans beginning in 2022 (ICR, paragraph 29).

Alignment with Country Priorities: The PDO is aligned with the country's priorities. Poland, Germany, the Czech Republic, and the European Union are members of the Odra River Commission. After the 1997 floods, each member country prepared a flood protection program. Poland prepared Oder 2006 Program to address flood protection, inland navigation, water quality protection, hydro-power production, land use planning, forestry and nature protection in the Odra River Basin. The Polish Council of Ministers adopted "The Strategy for Responsible Development (SRD) for the period up to 2020 (including the perspective up to 2030)" on 14th February 2017, which underscores the country's commitment to socially sensitive and territorially sustainable development and effective state and institutions contributing to growth. The PDO would contribute to support the achievement of these objectives by forming part of a new uniform water management structure to enhance protection from flood and drought (SRD, p.19). In addition, the country is pursuing the Odra-Vistula Flood Management Project, to build on the outcomes of this project.

Alignment with Bank Strategy: The PDO is highly relevant to the World Bank's Country Partnership Framework (CPF) for Poland (FY19-FY24) with an objective of building resilience to climate related events under 'Resilience to Environmental and Global Threats'. According to the CPF, the World Bank Group is taking a comprehensive and holistic approach to flood management critical for long-term, sustainable, social, economic, and environment development. This approach would combine infrastructure investments, policy measures, and institutional arrangements to support performance. The institutional strengthening needed to achieve the PDO is relevant to the CPF objective of advancing evidence-based design of policy and institutions.

Prior Bank Experience in the Country and the Sector: In response to the 1997 floods, the World Bank financed the Emergency Flood Recovery Project (EFRP, 1998) co-financed by the European Investment Bank (EIB) and other donors to support Poland's flood recovery, rehabilitate damaged municipal and rural infrastructure, and improve flood warning and forecasting systems. In this project, the Bank led in flood recovery, modernization of flood forecasting and early warning systems and prepared the feasibility studies for this Odra River Basin Flood Protection Project (PAD, paragraph 12). The World Bank is also implementing flood risk management initiatives in Romania and Bulgaria and projects to improve the efficiency and quality of water supply and wastewater service delivery in 11 countries of the Danube Water Program (ICR, Box 1).



Rating

High

4. Achievement of Objectives (Efficacy)

OBJECTIVE 1

Objective

"to protect the population in the Odra River Basin (ORB) against loss of life and damage to property caused by severe flooding."

Rationale

Theory of Change: The scale of inputs was adequate and properly sequenced for achieving the attributable outputs. Constructing a dry polder in Raciborz would result in 185 Mm³ of flood water storage capacity. A dry polder is a storage mechanism using machines to dry flood plain areas to better control the river system. Improvements of the Odra dikes and embankments, the Odra Channels and the Widawa Transfer would modernize the Wroclaw floodway system. Equipment and consulting services would improve emergency preparedness, complete flood protection and management plans, monitor and evaluate (M&E) impact, and create an Odra River Flood Management Center. Additional works would ensure compliance with safeguards. People affected by the construction will be resettled. The outputs would result in reducing extreme flood peaks and increase flood carrying capacity of the Wroclaw floodway system. The specific infrastructure interventions followed a logical sequence that led to protecting against flooding the more than 2.5 million people in Raciborz, Kedzierzyn, Kozle, Krapkowice, Opole, Brzeg, Olawa, and Wroclaw, and settlements in the three voivodships of Slaslue, Opolskie, and Dolnoslaslue around the ORB.

Outputs and outcomes were attributable to the project. The outcome indicators were expressed as preventing lives lost, or reduced damage to property or reduced flooded areas (in hectares). The outcome indicator did not include the value of improved economic activities as a result of flood protection stemming from the project's interventions. The TOC, however, reflected these as desired long-term impacts. There were no indicators to monitor these. The validity of the TOC in causally leading to PDO achievement depended on the following critical assumptions: (i) resettlement to be carried out during project implementation, (ii) available co-financing from the European Union Cohesion Fund and the Council of Europe Development Bank, (iii) successful recruitment of M&E consultants to evaluate project impact, implement the Environmental Management Plan (EMP), and the Resettlement Action Plan (RAP). One risk that was not mentioned was the timely establishment of the Project Coordination Unit (PCU). It was first planned as an agency under the National Water Management Authority in October 2007 but became operational only in 2008. By 2010, the PCU was replaced by an autonomous Odra River Basin Flood Protection Project Coordination Unit with its own budget. That PCU became operational in January 2011. The use of the EU Cohesion and ECB funds led to longer than expected period to finalize design and obtain environmental and construction permits because of the need to harmonize policies across EU accession, Polish legal framework, and Bank safeguards (see Section 10 Other issues below). At the 2017 restructuring, the baselines still used the 1997 flood's outcome



indicators but modified them as negative targets, i.e., no lives lost, no damage to property, no areas flooded similar to the magnitude experienced under the 1997 floods. These changes did not alter the TOC.

OUTPUTS:

- Protection against floods was provided to 2.5 million people from towns such as Racibórz, Kędzierzyn-Koźle, Krapkowice, Opole, Brzeg, Oława and Wrocław, and settlements in the three voivodeships of: Śląskie (Silesian Voivodeship), Opolskie (Opole Voivodeship) and Dolnośląskie (Lower Silesian Voivodeship) around the ORB.
- The Racibórz Dry Polder was constructed as designed with 185 Mm³ in built storage capacity. The completed design regulates discharges during a flood comparable to the 1997 event. Permanently acquired 1,145 hectares for the dry polder construction; The dry polder reservoir occupied an area of 26 km². and a 9.0 m water storage level. Associated outputs include (i) the permanent acquisition of 1,145 hectares for the dry polder construction; (ii) the construction of 22 km of embankments (dams) around the dry polder with earthen embankments having a maximum height of 11.1 m; and (iii) the construction of three pumping stations - Buków, Pogrzebień and Lubomia - located outside the reservoir. Relocation was also carried out, involving 250 residents from the old villages of Nieboczowy and Ligota Tworkowska to a new village called Nieboczowy with all public facilities.
- To modernize the Wrocław Floodway System, the following were completed: (i) modernization or rebuilding of 97.2 km of flood embankments; (ii) rehabilitation of 41.4 km of flood embankments with the construction / reconstruction of culverts, embankment stairs, and various types of anti-filtration screens; (iii) restoration of 37 km of canals in Wrocław; (iv) rebuilding or expanding of 2 weirs; (v) modernizing of 3 locks; (vi) rebuilding of 9 bridges including increasing their load capacity and building of a flyover road; (vii) building or rebuilding of 5 fish passes (A fish pass or fish ladder, or fish way, is a structure on or around artificial and natural barriers to facilitate diadromous fishes' natural migration as well as movements of potamodromous species); and (viii) planting of several thousand trees and restoration of 1.5 ha of alluvial forests.
- The PCU also identified new projects as planned. In 2013 the Concept Notes were prepared for the Bank's appraisal of three new flood protection projects: (i) the upper Vistula basin; (ii) the Nysa Kłodzka valley; and (iii) the Middle and Lower Odra. On September 10, 2015 the Bank and Poland signed a loan to co-finance the Odra-Vistula Flood Management Project (€460 million). The PCU monitored the implementation of the Resettlement Action Plans (RAPs), the construction of the new village of Nieboczowy, and land acquisition by the Lower Silesian Board for Amelioration and Hydraulic Structures (DZMiUW).
- Established the Odra River Flood Management Center (OFMC) for the upper and middle Odra river basin as planned. The ICR did not report on any Flood Information Centers (OKI) mentioned in the FA.
- Under the Resettlement Action Plan (RAP), 250 families were resettled, representing about 700 residents from the villages of Nieboczowy and Ligota Tworkowska. Homes, churches, cemeteries, and all public facilities were relocated and restored in a new village.

OUTCOMES:

- Using a state-of-the art modelling, the project simulated the achievement of full protection against floods of the 1997 magnitude. Using the 1997 flood as baseline, about 485,000 hectares were affected, assets damaged valued at 14.0 billion PLN (including flood fighting costs) and 57 people dead. The negative targets for project outcomes were that no land area would be flooded and that



there will be no loss of lives or damage to assets. There have been no 1997 floods since the project closed but this modelling showed that the completed infrastructure would allow the discharge floods without causing inundations, damage to property or loss of human lives. In addition, flash floods in October 2020 demonstrated that the completed dry polder worked as designed (ICR, footnote 16).

- The capacity of the beneficiary improved and would also support flood risk management in other regions of Poland. Improved capacity was evident in the development of river basin management plans under the EU Water Framework Directive and the flood risk management plans to adhere to the EU Floods Directive. These plans serve to protect the population against loss of life and damage to property caused by severe flooding. The increased capacity is also of high added value to the development and current implementation of the OVFMP (P147460).
- Flood risks were reduced. Social, environmental, and economic activities bordering the Odra and its canals increased. The study 'The Leveraging Potential of Public Investments in Flood Protection: The Case of Wrocław, Poland' estimated that the direct effects of these public investments on land value are in the order of at least hundreds of millions of dollars. Other long-term impacts of the investment include (a) improved resilience to floods in the ORB, (b) increased economic returns with reduced future losses and fiscal burden to the country and reduced incidence of poverty, and (c) improved investment climate and enhanced competitiveness and thus countrywide economic growth (ICR, paragraph 10).
- The project interventions improved the flood protection system and the system of hydro-met forecasting (SMOK). Over 2009 – 2018, the Institute of Meteorology and Water Management (IMGW) carried out activities related to (i) the implementation of quality control systems for hydro-meteorological measurements, (ii) the expansion of the functionalities of the Client Service System (CSS), (iii) the implementation of the Central Historical Database, and (iv) the development of quality control algorithms for hydro-meteorological measurements and hydrological forecasts. The full functionality of these systems was achieved in 2014. All modules of the system were used productively by IMGW.
- Success was achieved in the resettlement program, implemented from 2003 to 2018 and also in the activities to ensure compliance with social and environmental safeguards. The latter are now reported to be in use for other projects in the country and other unspecified countries (ICR, paragraph 38). The resettlement created a new city with fully functioning public facilities. Resettled residents were reportedly content with the new city. The World Bank acknowledged as best practice (ICR Box 2) the resettlement process in this project, which was accompanied by a thorough consultative communication strategy.

Overall, the efficacy of the project to achieve this objective is rated Substantial because all outcome indicators were achieved based on the modelling used.

Rating
Substantial

OVERALL EFFICACY

Rationale



The overall efficacy of the project to achieve the PDO is rated Substantial based on achievement of its outcome indicators.

Overall Efficacy Rating

Substantial

5. Efficiency

Economic Efficiency: Benefit-cost analysis was conducted at appraisal. Benefits were derived using "with" and "without" project scenarios. Benefits included estimated reduction of flood damages, and production of gravel during the life of the project. The analysis at appraisal assumed the following:

- a 10 percent opportunity cost of capital (PAD, paragraph 54);
- primary benefits from reduced annual average flood damages (calculated as the difference between expected flood damages "with" and "without the project" under various scenarios of flood severity (ICR, Annex 4, paragraph 3 and footnote 27) at a rate in direct proportion to the country's estimated 1.3 percent annual rate of its Gross Domestic Product (GDP) growth;
- PLN 20 million per year in secondary benefits from the extraction of gravel in the dry polder area.
- Investment costs under a "with" project scenario using 2002 prices were estimated at PLN 1,352 million overall, PLN 579 million for the dry polder component only, and PLN 670 for the modernization of Wroclaw flood system only. Additional O&M costs were estimated at PLN 1.37 million per year for the dry polder only and PLN 0.5 million for the Wroclaw flood modernization only. Investment costs "without the project" would be zero.

At appraisal, the project Net Present Value (NPV) was estimated at Euros 232.15 million (US\$304.98 million equivalent). The overall project benefit-cost ratio was 1.99 and an economic internal rate of return (EIRR) was 16.7 percent. For the dry polder component only; the benefit-cost ratio was at 1.86, and EIRR was 16.7 percent. For the Wroclaw floodway component only, the benefit-cost ratio was 2.1 and the EIRR was 16.6 percent.

At closing, the benefit-cost analysis used the same key assumptions at appraisal:

- a 10 percent opportunity cost of capital (ICR, paragraph 47);
- primary benefits from reduced damages use actual annual GDP growth rates;
- value of gravel extraction similar to that used at appraisal.
- investment costs were converted to current prices using GDP deflator (ICR, Annex 4, footnote 29). O&M costs at appraisal were used at closing. The overall investment costs was estimated at PLN 2,932 million; PLN 1,096.5 million for the dry polder component only, and PLN 863.7 million for the Wroclaw modernization component only. An additional cost of PLN 53.6 million accounted for final design, supervision, project management, and training.

At closing, the overall project NPV was estimated at Euro 139.54 million (US\$ 156.25 million equivalent). The overall benefit-cost ratio was estimated at 1.62 with an EIRR of 15.1 percent. For the dry polder component



only, the benefit- cost ratio was 1.31 and an EIRR of 13.0 percent. For the Wroclaw floodway system component only, the benefit cost ratio was 1.96 and an EIRR of 17.0 percent.

At closing, and after an overall five and a half year implementation delay, cost overruns reached 76 percent at real prices (or 48 percent at 2002 nominal prices). The cost overruns included a 28 percent price escalation from inflation between 2002 when original costs were estimated at appraisal and 2011 when project designs were finalized (ICR, paragraph 50). According to the ICR (Annex 4, paragraph 7): "The sensitivity analysis of the EIRR to changes in investment costs was performed at appraisal, finding that the project could withstand 100 percent increases in investment cost without lowering the EIRR to less than 10 percent."

Administrative and Operational Efficiency: Two level 2 restructurings extended the project completion by almost six years. The weak institutional framework and governmental reorganizations delayed start-up by about three years. According to the ICR, EU accession in 2004 (ICR, paragraph 23). introduced changes in policy and legal environment that delayed obtaining the environmental and construction permits and in finalizing engineering designs. Contracts for both project components, the dry polder and Wroclaw floodway system, started only in or after 2012 with new completion dates (2017). A breach in the construction contract for the dry polder and time overruns caused by complex resettlement processes (see Section 10 Other Issues below) required another extension. This operation strengthened the observation that flood risk management programs were time consuming and required more realistic long term engagements. Other flood risk management projects, for example, the Netherlands' Room for the River' program took 23 years to implement. The 76 percent project cost overrun over a five and a half year implementation delay still led to economic efficiencies that were above the 10 percent cost of capital. Efficiency is rated Substantial because the overall rates of return and those of its components remained above the country's cost of capital and positive benefit-cost ratios above 1.0. The EIRRs at closing were in line with those financed by the Bank elsewhere (ICR, paragraph 49), which were covered in the Bank's 2012 study "Understanding the Economics of Flood Risk Reduction: A Preliminary Analysis."

Efficiency Rating

Substantial

a. If available, enter the Economic Rate of Return (ERR) and/or Financial Rate of Return (FRR) at appraisal and the re-estimated value at evaluation:

	Rate Available?	Point value (%)	*Coverage/Scope (%)
Appraisal	✓	16.70	40.00 <input type="checkbox"/> Not Applicable
ICR Estimate	✓	13.00	51.70 <input type="checkbox"/> Not Applicable

* Refers to percent of total project cost for which ERR/FRR was calculated.

6. Outcome



The relevance of objective is rated High because the objective supports the country's priorities in flood risk management and contributes to the World Bank's strategic objectives in the country. The efficacy of the project to achieve the objective and overall efficacy are both rated Substantial because the outcome targets were achieved based on modeling to assess flood risks. Efficiency is rated Substantial because of comparatively substantial returns to investments even as the project experienced cost overruns. As a result, overall outcome is rated Satisfactory.

a. **Outcome Rating**
Satisfactory

7. Risk to Development Outcome

The ICR (paragraphs 101-104) identified the following risks to development outcomes:

- **Continued exposure to natural hazards and climate change:** Poland, which remains prone to flood hazards has prioritized a Flood Management and Water Security agenda in response to the devastating flood of 1997. It continues to improve its flood risk management of the Odra River Basin and other basins and is preparing the follow-on project on flood management for the Odra-Vistula. This new project is intended to add to the development outcome of this project. Furthermore, the Floods Directive under the EU requires an update every six years of the flood risk management plans for the river basins that Poland is currently preparing. The Government also expressed interest in long-term water security in the face of increasing climate variability that causes droughts and floods, and would consolidate and build on the institutional achievements of the project. This risk of continuing exposure to hazards, as well as those mentioned below, would be mitigated under the follow-on project.
- **Commitment to sustain nonstructural measures supported by the project.** Continuous quality control in the performance of the structures would ensure the integrity of the completed infrastructure. The improved capacity of the Odra River Flood Management Center lead to monitoring the effectiveness of the infrastructure by carrying out flood risk safety assessments, respond to floods in an integrated manner by using the flood forecasting system, and effective consultations informed by the experience from the broad stakeholder participation. Beneficiaries overcame implementation challenges, which benefits the follow-on project. Institutions evolved by continuously sharing knowledge and experience during implementation. Increased awareness also led to information redundancy, fortifying the concept of multiple safety levels including (i) reducing probability of flood risks, (ii) flood awareness in spatial planning and land use, and (iii) increased preparedness in case of an extreme event.
- **Sufficient financial and technical resources to operate and maintain the new infrastructure.** The government allocated resources to hire and train personnel to operate and maintain the works completed under the project. The non-infrastructure interventions institutionalized risk management with defined functions and responsibilities. For all civil works, O&M requirements were documented. The International Panel of Experts has reviewed the O&M for the dry polder, and provided



recommendations for optimum operations. In October 2020, discharges in the Odra increased due to floods, and the dry polder was tested and functioned as intended.

- **Gravel extraction to reduce floods.** The mining of gravel was foreseen at appraisal. With the gravel extraction, the total volume of the reservoir would increase to 270– 300 million m³ in 30 years to be filled mostly with water. The operational volume to retain peak floods would likely increase to a maximum of 200 million m³. This increase would provide additional capacity to further reduce flooding downstream of the Raciborz dry polder.

8. Assessment of Bank Performance

a. Quality-at-Entry

The project was designed as a follow-on to the 2007 EFRP. All feasibility studies were prepared under that previous operation. Lessons learned from the EFRP experience were incorporated into project design. In addition, the following lessons were considered in design (PAD, paragraph 29): (i) thorough hydrological and hydraulic analyses - project interventions were designed incorporating results of basin wide flood protection management; (ii) complete detailed design of key works prior to negotiations - designs were undertaken as part of the preceding project; (iii) use of large civil works contracts with adequate resources for construction supervision - design divided the contracts into 9 large packages representing 90 percent of project loan (according to the Implementation Status and Results Report), with contract supervision; (iv) resettlement and land acquisition issues dealt up front - the Resettlement Action Plan was prepared prior to appraisal with consultations beginning under the preceding project; (v) design was kept simple - the project had two major infrastructure components; and (vi) Bank's leadership role to leverage a substantial package - the Bank's loan was 19 percent of total project cost.. Consultations with stakeholders were integral to project design. Accession to the European Union (EU) on May 1, 2004 and coordination with the Czech Republic and Germany under the International Commission for the Protection of the Odra (ICPO) informed project design. Agreement with the ICPO led to the "Oder 2006 Program for Poland," which included flood risk management considerations that were included in the project components. Harmonizing Polish environmental laws with EU directives resulted in including Environmental Impact Assessments (EIAs) in detailed design and contract-specific bidding documents. The collaboration with other donor partners in the preceding EFRP mobilized significant amounts of co-financing from the CEB and the EU Cohesion Fund. The Bank team conducted training to strengthen capacity in fiduciary obligations as well as in economic aspects of compliance with environmental and social safeguards. Design adopted an overly optimistic timeframe as borne out by the need to extend the project twice in increments of three and two and a half years. Another shortcoming at entry was the assessment of compliance risks associated with the harmonization of policies across various sources of funds. The initial three-year delay negatively affected implementation capacity (see below).

Quality-at-Entry Rating
Satisfactory

b. Quality of supervision



The World Bank team conducted 25 regular supervision missions and technical missions with experts and specialists over the 13-year implementation period. There was no mention of turnover in Task Team leadership and if this affected supervision during the initial implementation delay. Several factors contributed to three year start up period. These included the change in government, which affected the establishment of the Project Coordination Unit (PCU). Fiduciary and safeguards specialists carried out technical missions and supported the Project Coordination Unit (PCU) to ensure compliance with Bank policies while harmonizing with the requirements of EU accession, including those associated with procurement challenges (see Section 10 Other Issues below). The Bank team also provided technical support to ensure M&E systems were adequately strengthened (see Section 9, M&E (c) Utilization below). Restructuring was also used to reinstate values of baselines and targets for outcome indicators from the original results framework to maintain consistency in M&E reporting. The team supported continued collaboration with the government in flood risk management, evident in the completed EFRP, this project and the follow-on project. (ICR, paragraph 30).

Quality of Supervision Rating

Satisfactory

Overall Bank Performance Rating

Satisfactory

9. M&E Design, Implementation, & Utilization

a. M&E Design

Monitoring and Evaluation (M&E) was designed using state-of-the-art modeling and detailed analytical work. Hydraulic modeling was conducted during preparation and repeated periodically during implementation (see below). Different works identified conceptual design requirements. The interoperability of the different components (rivers, canals, sluices, weirs, and so on) used the discharges of the 1997 event to test the performance of the designed water system.

Design parameters for the infrastructure works and the nonstructural interventions would account for the safe discharge of the peak as occurred in 1997. The systematic and integrative approach acknowledged that infrastructure works and non-structural interventions would lead to proper operation and maintenance (O&M) of the system. M&E design included indicators to monitor and evaluate (i) the improvement of the flood early warning system, and (ii) the increased institutional capacity in O&M and the development of flood risk management plans, as well as the implementation of the Resettlement Action Plan (RAP) and Environmental Management Plan (EMP). The M&E design was comparable to the ones used for the "Room for the River" program in the Netherlands and the protection of the city of New Orleans in the United States. Indicators included the level of completed works designed for the required flood return period, and institutional and technical capacity to ensure proper operation of the built infrastructure.

The target values from the baselines and the intermediate and final outcome indicators were reinstated from the original results framework in the PAD and further clarified in October 2017. The targets for the indicators were defined as 'Full protection against floods of the 1997 magnitude between Raciborz and Wrocław city' for Component A and 'Full protection of Wrocław against floods of the 1997 magnitude' for



Component B. These were linked to the full completion of the works included in Components A and B. Component C's indicator was defined as 'Improved flood forecasting and better linkage of forecaster and communication with flood management' with the target to achieve 'Established institutional and communication setup for operation of various structures in the system'. To ensure that the implementation of Components A and B conformed to World Bank standards, Component D was to assess the implementation of the RAP design of infrastructure and construction completion on time. For flood risk reduction projects that are based on a systemic integrated approach grounded on thorough modeling and analytical work, the combination of targets set for the completion of structural and nonstructural interventions is a proper way to measure the level of PDO achievement. M&E was adequately designed to assess progress during implementation.

b. M&E Implementation

The Project Coordination Unit (PCU) of the Ministry of the Environment implemented the M&E system as designed. The World Bank team initially supported the PCU in implementing the M&E system while the PCU strengthened its capacity to report and evaluate progress. Hydraulic modeling was repeated periodically during implementation. The PCU submitted quarterly and annual reports on time with information on financial and physical progress, financial statements, and procurement. The annual reports included the coming year's work plan. (ICR, paragraph 77).

c. M&E Utilization

The project review missions of the World Bank and co-financiers, used data generated by the M&E system. A midterm review in 2011 provided a good review of progress and next steps. The 2011 MTR indicated potential risk of delays but most of the corrective measures appeared to be manageable at that time. Even then, no restructurings were planned. The first restructuring addressed disbursement categories and procurement strategies.

M&E is rated Substantial. The M&E was customized to meet requirements under a flood risk management project as designed. M&E was implemented to ensure sufficient understanding of project status and corrective measures to address implementation challenges along the way. The M&E data and reports were used to inform project operations. The same system would be used in the follow-on project indicating its adoption in the institution supporting flood protection.

M&E Quality Rating

Substantial

10. Other Issues

a. Safeguards

Environmental Safeguards. The project was assigned an environmental category "A" and triggered the seven safeguard policies (ICR, paragraph 80 noted seven but the PAD and the Operations Portal mentioned six safeguard policies): Environmental Assessment (OP/BP 4.01), Natural Habitats (OP/BP



4.04), Physical Cultural Resources (OP/BP 4.11), Involuntary Resettlement (OP/BP 4.12), Forests (OP/BP 4.36), Safety of Dams (OP/BP 4.37), and Projects on International Waterways (OP/BP 7.50). The project complied with the environmental safeguards policies according to the Operations Portal and the ICR (paragraphs 81-87).

All works contracts complied with OP/BP 4.01 (Environmental Assessment) with contract-specific Environmental Impact Assessment (EIA) procedures. Mitigating measures accompanied identified environmental impacts and were duly compensated, as needed. The Environmental Management Plan (EMP) detailed all mitigation, compensation, and monitoring measures. Comments and suggestions from local communities were incorporated into the EIAs and EMP. The documents were published and were available to the public. All works contracts used special procedures to ensure compliance with the principles of OP/BP 4.04 (Natural Habitats). In the case of OP/BP 4.36 (Forests), people affected by contracts where trees or shrubs were removed were duly compensated (ICR, paragraph 83). All works carried out necessary archaeological and conservator's supervision in compliance with OP/BP 4.11 (Physical Cultural Resources). Wayside shrines and conciliation crosses were relocated from the dry polder area and reinstalled in the new village of Nieboczowy at places of religious worship, preserving historically valuable original elements (ICR, paragraph 84). Implementing OP/BP 4.12 (Involuntary Resettlement) posed considerable challenges because of significant differences in land acquisition for construction purposes using Polish and EU regulatory frameworks and OP/BP 4.12. Where differences between Polish legislation and the provisions of OP 4.12 were found, principles more favorable to project affected persons (PAP) were adopted. In the case of OP/BP 4.37 (Safety of Dams) an international panel of experts was established to monitor and evaluate the civil works as well as the operation and monitoring plans prepared for the new installations. The International Dam Safety Panel of Experts (IPE) advised on the design and construction of the dam and embankments for the dry polder (ICR, paragraph 97). On OP/BP 7.50 (Projects on International Waterways), the project was discussed with the Czech Republic and Germany. Letters to notify the riparian states and the Odra Commission, advising them of the project scope, design details, and possible environmental impact, were sent on June 10, 2005. Germany (July 15, 2005) and the Czech Republic (July 11, 2005) confirmed that the foreseen works in the project were in the international flood protection program of the Odra Commission.

Social Safeguards: The project established a grievance redress mechanism (GRM) as planned. A Resettlement Action Plan (RAP) was prepared and disclosed. The Project Coordination Unit (PCU) monitored grievances in coordination with Project Implementation Units (PIUs) and reported these to the Bank in a timely manner. Affected people were aware of the GRM and have been using the system. As of November 2020, over a dozen cases remained pending and awaiting resolution (ICR, paragraph 88). These were associated with completing compensations affected by the lengthy administrative and court procedures under the Polish legal system. In some cases, some of the acquired properties, including those with unresolved inheritance cases had uncertain legal standings. Funds necessary for the compensation were set aside and would be released after public administration bodies reach their final decisions/rulings. Water reform in Poland changed the entity managing state treasury-owned plots and were awaiting legal resolutions. These issues had no impact on project affected people (ICR, paragraph 88). The resettlement process proved to be time consuming and was held as one of the reasons for the lengthy implementation (ICR, paragraph 71) but nevertheless acknowledged as best practice (ICR, Box 2).

b. Fiduciary Compliance



Financial Management: The project faced implementation challenges such as workload shifts due to reorganizations and cumbersome funds transfer procedures, which delayed payments. The PCU, PGW WP, involved ministries and the World Bank collaborated to adopt timely corrective measures using existing legal internal control procedures. The government publicly disclosed project audit reports that were received and accepted by the World Bank on the project (PCU) website. (ICR, paragraph 91). According to the Operations Portal, the SAI submitted the final audit in June 2020 with unqualified (clean) opinions.

Procurement: The ICR indicated that project procurement was satisfactory (ICR, paragraph 92). The implementing agency had adequate experience and capacity to manage the procurement processes and ensure that the project complied with the World Bank’s procurement guidelines. The PIUs managed large-value contracts in an effective manner using modern contract management tools and alternative dispute resolution mechanisms for timely and efficient claims settlement. The lengthy implementation period was partly attributed to procurement delays. Due to the harmonization needs of safeguards and land acquisition policies, for example, some contract-specific EIAs were redone. A construction contract had to be terminated for breach and was re-bid. In another case, a leader of a joint venture implementing another contract declared bankruptcy although the project was eventually completed according to the contract (ICR, paragraph 70). The World Bank team conducted several procurement trainings and workshops to strengthen the PIUs’ knowledge on the World Bank’s procurement policies and procedures, and contract management. The Supreme Audit Office of the government (SAI) conducted annual procurement post reviews with no major issues (ICR, paragraph 92).

c. Unintended impacts (Positive or Negative)

d. Other

11. Ratings

Ratings	ICR	IEG	Reason for Disagreements/Comment
Outcome	Satisfactory	Satisfactory	
Bank Performance	Satisfactory	Satisfactory	
Quality of M&E	Substantial	Substantial	
Quality of ICR	---	Substantial	

12. Lessons

The ICR offered six lessons (ICR, paragraphs 105 - 110 and paragraph 43). Three of those, slightly edited, are presented below:



- **Using limited IBRD resources to leverage (and lead) a much larger financing consortium is an effective way to increase impact and build country systems and capacities in advanced clients.** The collaboration with the co-financiers (CEB, and European Commission) required extensive effort to harmonize operational requirements. Expectations, objectives and processes required constant consultation. The experience enhanced the World Bank's position to serve as honest broker and lead in establishing best practices. The complex project served as a platform to facilitate convergence of national systems (notably on environment, river basin management, procurement and financial transparency, safeguards, economic analysis, and so on) with those of the EU and the World Bank. Operationally, the availability of three different financing sources gave the project liquidity, lower capital cost, and maintained good relations with contractors who were paid on time.
- **Project experience may facilitate knowledge exchange partnerships with organizations outside the project and in other countries.** Exchanges of experience in flood risk management were shared with countries in the Balkans. Poland shared its strong experience in works execution and benefited from better forecasting know-how and hardware specifications for projects managed by the International Sava River Commission in Zagreb. Joint workshops were held. The Odra project was a keynote presentation at several professional fora in the United States and in Europe, including the 2015 Amsterdam International Water Week.
- **Flood risk management projects should plan for likely technical complexity and consultations with multiple stakeholders with competing interests.** The spatial impacts of these projects involve many stakeholders with competing interests. These projects require thorough participation programs involving different authorities (national, regional, and local), NGOs, the private sector, and residents in the areas affected by the interventions. These complex processes result in drawn out flood risk management implementation periods. A lesson in success was anchored in the consultative communication program of the resettlement process.

13. Assessment Recommended?

Yes

Please Explain

The breadth and depth of World Bank experience in flood risk management globally, the heightened hazards from climate change, and a follow up to the 2012 preliminary analysis of the economics of reducing flood risks are some reasons why the Bank may benefit from an assessment of its global investments in the sector. The World Bank is currently implementing flood risk management initiatives in Poland, Romania, and Bulgaria while on water quality the World Bank supports 11 countries involved in the Danube Water Program to improve the efficiency and quality of water supply and wastewater service delivery in the region (ICR, Box 1).

14. Comments on Quality of ICR



The ICR was clear and provided relevant information and useful analysis. The detailed discussion around project efficiencies was particularly useful and supported by Annex 4. The detailed justification behind the four level 2 restructurings were also helpful. The report was candid. For example, the factors that affected the lengthy implementation period and resulting cost overruns were clearly laid out. The quality of the analysis justified the ratings. The report was based on evidence and results-oriented with numerous cross referencing to ensure consistency and strengthen the basis for the ratings. For example, the cogent outcomes beyond those monitored (see ICR, paragraphs 40, following and 61) were persuasive arguments for the substantial outcome rating. Lessons were derived from the project operations.

There were some shortcomings, however. Although the ICR generally followed OPCS guidelines, the main report exceeded the 15-page suggested length. There were also inconsistencies in figures provided. For example, not all disbursements against each component (ICR, paragraphs 15-18) matched those in Annex 3. As a result, the sum of the disbursement (US\$892.04 million) did not match the sum in Annex 3 (US\$ 886.78 million). In addition, total disbursements in Table 3 (Euros 886.78 million) was the same as the sum in Annex 3 but in US\$ (US\$886.78 million) and did not match the total disbursements in the data sheet (US\$1,018.57 million). This was very confusing. The ICR data sheet correctly reported the US\$ equivalent of Euro contributions, e.g., the EU Cohesion Fund contributed Euros 101.29 million or US\$130 million equivalent; and the ECB contributed Euros 112.98 million or US\$145 million equivalent.

a. Quality of ICR Rating
Substantial