



1. Project Data

Project ID P132101	Project Name MG-Emerg Infra Preservation & Vulnerabil	
Country Madagascar	Practice Area(Lead) Transport	
L/C/TF Number(s) IDA-51870	Closing Date (Original) 30-Jun-2017	Total Project Cost (USD) 93,739,527.26
Bank Approval Date 29-Nov-2012	Closing Date (Actual) 30-Jun-2018	
	IBRD/IDA (USD)	Grants (USD)
Original Commitment	102,000,000.00	0.00
Revised Commitment	102,000,000.00	0.00
Actual	93,761,259.36	0.00

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2. Project Objectives and Components

a. Objectives

The project development objective (PDO) was to preserve key lifeline infrastructure and reduce household vulnerability in targeted areas (Financing Agreement (FA), page 5). The PDO stated in the Emergency Project Paper (EPP), page 9, was identical. The PDO was not revised.

b. Were the project objectives/key associated outcome targets revised during implementation?



Yes

Did the Board approve the revised objectives/key associated outcome targets?

No

c. Will a split evaluation be undertaken?

Yes

d. Components

The project had three components, under which the activities presented below were expected to be financed (EPP, pages 10 to 12).

Component A: Rehabilitation of Lifeline Infrastructure and Disaster Risk Mitigation (cost at appraisal US\$72 million; cost after first restructuring US\$76 million; cost after second restructuring US\$78 million; actual cost not available). This component had the following four sub-components:

Sub-component A.1: Rehabilitation of Transport Lifeline Infrastructure (cost at appraisal US\$57.5 million; cost after first restructuring US\$54.5; actual cost US\$ 48.37 million) to finance the (i) rehabilitation and asset preservation of four existing major metallic bridges on key national roads, (ii) rehabilitation works on key national roads, including the rehabilitation of road drainage structures, culverts, small bridges, road slope protection works and minor stretches of roads, (iii) reconstruction of smaller bridges that have exceeded their design life, (iv) road asset preservation through the provision of minor civil works and equipment required to enforce axle load limits on key national roads, (v) acquisition of a stock of portable metallic bridges, and (vi) minor works and acquisition of equipment to ensure compliance to International Security Codes (ISPS) for Madagascar's major port. This sub-component was also to strengthen the capacity of the Roads Authority of Madagascar (ARM) to preserve key transport-related lifeline infrastructure by financing (vii) a study and develop an action plan to convert ARM into a fully autonomous agency to manage the road network and (viii) finance ARM staff salaries.

Through a first restructuring in 2013, the target for the "km of rehabilitation works on key national roads" was reduced from 800 to 682, and the target for the "number of bridges to be rehabilitated/reconstructed" was increased from 11 (EPP, annex 2) to 13. Through a second restructuring in 2016, the target for the "km of rehabilitation works on key national roads" was further reduced from 682 to 460, and the target for the "number of bridges to be rehabilitated/reconstructed" was decreased from 13 to 6.

Sub-component A.2: Rehabilitation of Community-level Basic Infrastructure (cost at appraisal US\$10.0 million; cost after first restructuring US\$7.4 million; actual cost US\$8.93 according to the task team) to finance community-level infrastructure sub-projects in crisis-affected areas, including rehabilitation and reconstruction of schools, basic health centers, erosion control structures, water points, and feeder roads. Communities most affected by crises were expected to be targeted. This sub-component was also to provide training to the agencies involved in its implementation.



With the 2013 restructuring, the number of sub-projects to be financed under this sub-component was reduced from 177 to 125 by dropping 52 water and watershed protection sub-projects. The output targets related to this sub-component did not change. Through the 2016 restructuring, the target for the "km of rehabilitated rural roads" was reduced from 115 (EPP, annex 2 and 2013 Restructuring Paper (RP), page 11) to 80 (2016 RP, page 13). The targets for the "number of additional classrooms to be build or rehabilitated" increased from 190 to 288, and the one for "health facilities to be constructed or renovated" increased from 19 to 21.

Sub-component A.3: Enhancement of Disaster Risk Management Capacity (cost at appraisal US\$4.5 million; cost after first restructuring US\$4.1 million; actual cost not available) to (i) rehabilitate the existing degraded national hydro-meteorological monitoring and analysis network, (ii) strengthen communications links between the national General Directorate of Meteorology (DGM) and disaster response agencies, (iii) improve the DGM's technical skills in weather forecasts and projections, (iv) finance the purchase of equipment to improve cyclone and flooding early warning systems (EWSs) that relied on the forecasts developed by the DGM, (iv) provide training to central and local operators and affected communities in the uses of the EWSs, (v) develop and ensure the application of climate-proof construction norms for key lifeline infrastructure based on the "Build Back Better" approach, and (vi) provide centralized and decentralized emergency response agencies with essential equipment and training to improve post-disaster response planning and coordination, including equipping of a by then recently established national disaster response center and expanding the system of rapid post-disaster data collection.

Through the 2013 restructuring, several activities under this sub-component were dropped and the budgets for other activities were reduced. With the 2016 restructuring, a regional approach for local communities to better prepare and respond to disasters was adopted (ICR, para 19), and the "number of communes covered by functional flood or cyclone EWSs" was increased from 70 to 172 because the equipment was less sophisticated and expansive than anticipated.

Sub-component A.4: Disaster Recovery Contingency Funds (cost at appraisal US\$0 million; cost after first restructuring US\$10 million; cost after second restructuring US\$12 million; actual cost not available). This subcomponent consisted of a zero-budget disaster recovery contingency fund to be triggered in the event of a natural disaster. It was triggered in 2013 to respond to a migratory locust outbreak.

Component B: Reduction of Household Vulnerability (cost at appraisal US\$25.5 million; cost after first restructuring US\$21.5 million; cost after second restructuring US\$19.5 million; actual cost not available). This component had the following four subcomponents:



Sub-component B.1: Preservation of Productive Capacity in Agriculture (cost at appraisal US\$15.5 million; cost after first restructuring US\$11.5; cost after second restructuring US\$9.5 million; actual cost not available) to finance (i) emergency distribution of improved seed, fertilizer, tools and associated technical assistance to enable rapid increases in food production, (ii) rehabilitation and maintenance of small-scale agricultural infrastructure, mainly micro-irrigation systems, (iii) watershed protection activities needed to preserve the productive capacity of agricultural infrastructure, and (iv) capacity strengthening of producers' organizations and community groups to sustainably manage irrigation infrastructure and take advantage of income generating opportunities provided through the project. These activities were to be financed using a matching grant mechanism through which the project was to provide a grant to match the contribution in cash, labor, or construction materials of a beneficiary association.

The 2013 restructuring reduced the targets for the "area provided with irrigation and drainage services" from 6,000 ha to 5,200 ha. It also reduced the number of sub-projects to be implemented by 446, including micro-irrigation, income-generating, watershed management, and capacity building activities (ICR, page 60). The ICR does not mention how many sub-projects this sub-component was originally meant to carry out and how many were executed. Through the 2016 restructuring, activities such as the rehabilitation of small scale irrigation schemes and capacity building for water users' associations were dropped, and the target regarding the "area provided with irrigation and drainage services" was reduced from 5,200 ha to 4,900 ha. The dropped activities were supported by the Emergency Food Security and Social Protection Project (P147514) (2016 RP, page iv).

Sub-component B.2: Cash-for-Work Program (cost at appraisal US\$10.0 million; actual cost US\$9.13 million according to the task team) to finance a cash-for-work program that provided access to short-term employment in crisis areas while improving small-scale infrastructure, such as drainage for streets and irrigation canals, basic road maintenance, soil erosion control, rehabilitation of mangroves, and rehabilitation of feeder roads and small bridges, at the community level.

Through the 2016 restructuring, the focus of this sub-component was changed to better target the most vulnerable people and provide them with several work opportunities. This resulted in a reduction of the targets for the "beneficiaries" of this sub-component from 124,000 to 91,000 and the "person-days of employment to be created" from 4,400,000 to 3,299,394.

Component C: Project Management and Coordination (cost at appraisal US\$4.5 million; actual cost not available). This component was to finance project management and coordination costs.

Notes: The task team has information on disbursed amounts by disbursement category but not on the actual costs of all components and sub-components. The project costs for all components and sub-components at appraisal and restructuring do not include contingencies.



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

Project Cost

The ICR (Annex 3) shows an actual cost at project closing of US\$102.00 million, which is exactly the same as the appraisal cost. The task team confirmed that the actual project cost was US\$93.74 in line with the information in the operations portal. This corresponds to 92 percent of the appraisal estimate of US\$102.00 million. The task team pointed out that the difference is due to the devaluation of the SDR, which reduced the availability of funds for the project and led to a slight reduction in project activities under all sub-components (for details see Dates and Project Restructurings below).

Financing

The project was to be financed through an IDA credit in the amount of SDR66.20 million, equivalent to US\$102.00 million (FA, page 1). The actual IDA financing was SDR64.87, equivalent to US\$93.74 million. The disbursed amount in SDR is 2 percent lower than the appraisal estimate. The project had an undisbursed balance of US\$1.84 million.

Borrower Contribution

The project had no Borrower contribution.

Dates and Project Restructurings

The project was approved by the Board on November 29, 2012 and became effective on April 17, 2013. The original closing date was extended by a total of 12 months from June 30, 2017 to June 30, 2018. The project was restructured four times.

In 2013, the project was restructured to activate the zero-budget Sub-component A.4: Disaster Recovery Contingency Funds to respond to a locust invasion alert. US\$10 million were reallocated to this Sub-component A.4 from the other sub-components of component A and from sub-component B.1. Given this reallocation of funds, the results framework, the project costs, the disbursement estimates and categories, and the financial and procurement arrangements were changed.

In 2016, the project was restructured to reallocate an additional amount of US\$2 million to Sub-component A.4: Disaster Recovery Contingency Funds from subcomponent B.1, and some of the activities under sub-component B.1 were dropped. Moreover, the team (i) reprioritized and dropped some of the works under



sub-component A.1, (ii) applied greater selectivity in the cash-for-works program, and (iii) adopted a regional approach to support local communities to prepare and respond to disasters instead of working with communes as originally planned. In addition to the reallocation of funds to sub-component A.4, these changes were necessary because of the devaluation of the SDR, cost increases, for instance, under the bridge sub-component and the cash-for-work program, and the lack of capacity for disaster management at commune level. The changes required a change in the results framework, changes in the disbursement estimates and allocations, and in the implementation arrangements.

With the February 2017 restructuring, the closing date was extended by six months to December 31, 2017. With the December 2017 restructuring, the closing date was further extended by six months to June 30, 2018. Both extensions were necessary to complete ongoing project activities.

No split rating is proposed for the 2013 restructuring because it only reallocated funds from several sub-components to the zero-budget Disaster Recovery Contingency Funds and adjusted the activities and targets for some indicators accordingly. The 2016 restructuring lowered the level of ambition of the project, and a split rating is warranted. At the time of the 2016 restructuring, 75.28 percent of the credit was disbursed.

3. Relevance of Objectives

Rationale

The relevance of the PDO is rated high. The project was designed in a context of severe political crises, which negatively affected the country's economic performance and led to a suspension of external aid. The situation was aggravated by a series of weather-related disasters. In response to the decline in fiscal revenues, the government, among others, reduced public expenditures, drastically decreasing the investment and maintenance of key infrastructure and lowering social protection expenditures. Between 2007 and 2010, spending on social protection decreased from 13.4 percent to 2.9 percent of total expenditures. In terms of key infrastructure, in the road sector, for instance, the total network decreased from 48,700 km in 1975 to 31,600 km in 2010 due to lack of maintenance and investment.

In 2010, 60 percent of the poorest households were affected by catastrophic events, including cyclones, floods, droughts, and locust invasions. These people generally depended on agriculture and lived in remote rural areas, where access was critical both in terms of reaching social services and markets as well as for emergency prevention and response.



Therefore, at appraisal, to preserve key lifeline infrastructure and reduce household vulnerability in targeted areas, which were chosen among the most crisis-affected areas, was highly relevant.

The importance of this objective was reflected in the 2007-2013 Second Poverty Reduction Strategy Paper, which reaffirmed the government's commitment to build and maintain infrastructure, increase agricultural production, enhance social protection, and mitigate the impacts of and respond to natural disasters (EPP, page 7). The importance of the PDO was also reflected in Madagascar's Two-Year Interim Strategy Note, approved in February 2012. The Note advocated a selective approach to new lending that sought to mitigate the substantial impacts of the crises on vulnerable segments of the population. It identified social and other critical sectors, such as transport and agricultural infrastructure and the environment, as key areas for eventual new lending (EPP, page 13).

The PDO remained highly relevant at project closure. According to Madagascar's 2017-2021 Country Partnership Framework (CPF) (pages 1, 2, 10, 13,17, 20 and 22), the medium-term growth outlook was positive, but in 2012, only 30 and 10 percent of the population lived above the national and international poverty lines, respectively. The CPF noted that (i) poverty was significant higher in rural areas, where agriculture was the main source of income, (ii) Madagascar was one of the world's most exposed and vulnerable countries to climate change, with the poor being most affected, (iii) lack and poor quality of transport infrastructure constituted a constraint that limited access to markets and touristic sites, and (iv) effective social protection of the most vulnerable and poor population in Madagascar was largely absent.

Against this background, the 2017-2021 CPF seeks to increase resilience of the most vulnerable and promote inclusive growth, while strengthening national and local institutions to reduce fragility. This includes building on greater social cohesion at the local level to reduce fragility risks and deliver basic services. It also focuses at generating employment opportunities (e.g., agri-business, tourism, fisheries) and building infrastructure in energy and transport that currently constrains the development of economic activities and access to markets. Making infrastructure more resilient continues to be an area of Bank support.

Similarly, Madagascar's 2015-2019 National Development Plan seeks, among others, to (i) support development, including increased the fiscal space and trade, (ii) foster growth and local roots development, with a focus on key sectors, such as agriculture and strategic infrastructure, (iii) enhance human capital, including stronger social protection mechanism, and (iv) strengthen resilience to natural disasters.

The PDO was realistic and its ambitions were adequate, considering the difficult political and economic situation in the country.



Rating

High

4. Achievement of Objectives (Efficacy)

OBJECTIVE 1

Objective

To preserve key lifeline infrastructure in targeted areas.

Rationale

According to the theory of change, the rehabilitation/replacement of bridges and roads on the main national road network combined with the control of vehicle overloading, the rehabilitation of classrooms, health facilities, rural roads, and other small infrastructure prioritized by the community, and technical assistance to the implementation agencies in charge of the rehabilitation and maintenance were expected to preserve key lifeline infrastructure.

Outputs

The following outputs were achieved during the life of the project to meet objective 1 (ICR, paras 27 to 28 and annex 1):

- Six rehabilitated or reconstructed bridges, which is significantly lower than the original target of 11 bridges and an initially revised target of 13 bridges. However, the six bridges correspond to 991.5 m of bridge rehabilitated or reconstructed, while the total length of the 13 bridges to be intervened was 1,085.9 m, which is only about 10 percent less than the initially revised target of 13 bridges. The length of the 11 originally envisaged bridges is not given in the ICR.
- 185 m of modular metallic bridges acquired or reconstructed, which exceeds the original target of 164 m.
- 463 km of rehabilitated non-rural, i.e. national, roads, which is significantly lower than the original target of 800 km.
- 10 operational weighing stations managed by ARM, which exceeds the original target of 8.
- 105 km of rehabilitated rural roads, which is close to the original target of 115 km.
- Nine rehabilitated water supply infrastructure.
- 37 rehabilitated access roads.
- Six rehabilitated small bridges.
- 23 rehabilitated health facilities, which is close to the original target of 19.
- 482 rehabilitated primary school classrooms, which is substantially higher than the original target of 190.
- Toamasina, Madagascar's main port, in compliance with International Security Codes.



- Resilient urban pilot road of less than 1 km in Antananarivo, with re-dimensioned drainage structures, reinforced pavement, and enhanced road safety features.
- Resilient construction norms for rural roads, schools, health facilities, and irrigations dams approved and applied under the project.
- 17,500 consulted people in the framework of the preservation of community-level basic infrastructure, compared to an original target of 9,700 people. The 2016 RP (page 20) explains that this was due to underestimation at appraisal.
- 126 rice irrigation and drainage rehabilitation sub-projects in areas affected by cyclones.

The task team noted that the following outputs:

- Study to strengthen ARM, including revised responsibilities, structures, financing and other resources as well as training needs. The recommendations of the study were not implemented due to lack of ownership.

Outcomes

The outcome indicators to measure the achievement of objective 1 consisted of the "share of rural population/number of people with access to an all-weather road" and the "direct project beneficiaries". The first indicator was difficult to measure in the Madagascan context and no information was collected (the indicator was later revised). In addition, the rehabilitation of rural roads was only one of many activities expected to contribute to the preservation of key lifeline infrastructure. The number of "direct project beneficiaries" does not indicate if lifeline infrastructure was preserved. These indicators are inadequate to measure objective 1, hence this assessment is based on the achievement of the targets in the rehabilitation or reconstruction of key infrastructure in the targeted areas, which can be considered a reasonable measure of "preserving key lifeline infrastructure".

Under the original indicators and targets, the efficacy of this objective is rated modest. The rehabilitation, in line with resilient standards, of bridges and roads on the national network together with the enforcement of vehicle weight limits preserved key lifeline infrastructure. However, the bridge rehabilitation target was not fully achieved, the km of non-rural roads rehabilitated was significantly lower than the original target, and some areas on the rehabilitated national roads deteriorated two and a half years after the respective works. The task team explained that this was due to the soil conditions and the fact that the rehabilitation works only sealed the roads but did not change its structural base. ARM was also not strengthened, which might impact the sustainability of the roads.

The rehabilitation of classrooms, health facilities, rural roads and other infrastructure, in line with resilient standards, preserved infrastructure identified as vital at the community level. For classrooms, the original target was largely exceeded. For health facilities and rural roads the targets were nearly achieved.



The rehabilitation of rice irrigation and drainage infrastructure in the aftermath of cyclones, preserved rural infrastructure vital for agriculture productions. The task team pointed out that the irrigation infrastructure rehabilitated according to the new resilient standards resisted several heavy rains and cyclones, while the infrastructure built according to previous standards collapsed.

Rating

Modest

OBJECTIVE 1 REVISION 1

Revised Objective

To preserve key lifeline infrastructure in targeted areas.

Revised Rationale

The projects theory of change remained unchanged since only the ambition of the project related to this objective was reduced.

Outputs

The following outputs were achieved during the life of the project to meet objective 1 (ICR, paras 27 to 28 and annex 1):

- Six rehabilitated or reconstructed bridges, which is in line with the final revised target.
- 185 m of modular metallic bridges acquired or reconstructed, which exceeds the original target of 164 m.
- 463 km of rehabilitated non-rural, i.e. national, roads, which is in line with the final revised target of 461 km.
- 105 km of rehabilitated rural roads, which is higher than the revised target of 80 km.
- 10 operational weighing stations managed by ARM, which exceeds the original target of 8.
- 23 rehabilitated health facilities, which is higher than the revised target of 21.
- 482 rehabilitated primary school classrooms, which is substantially higher than the revised target of 288.
- Toamasina, Madagascar's main port, in compliance with International Security Codes.
- More resilient urban pilot road of less than 1 km in Antananarivo, with re-dimensioned drainage structures, reinforced pavement, and enhanced road safety features.
- Resilient construction norms for rural roads, schools, health facilities, and irrigations dams approved and applied under the project.
- 17,500 consulted people in the framework of the preservation of community-level basic infrastructure, compared to a revised target of 11,742.
- 126 rice irrigation and drainage rehabilitation sub-projects in areas affected by cyclones.



The task team mentioned that the following outputs:

- Study to strengthen ARM, including revised responsibilities, structures, financing and other resources as well as training needs. The recommendation of the study were not implemented due to lack of ownership.

Outcomes

Under the revised indicators and targets, the efficacy of this objective is rated substantial. With 101,237 people, the new outcome indicator of "people in rural areas (fokontany) who gained access to an all-season road" overachieved its target of 53,000 people. All key lifeline infrastructure rehabilitation works, executed in line with resilient standards, also met or exceeded the project targets. Shortcoming in the preservation of key lifeline infrastructure included the early deterioration of some areas on the rehabilitated roads and the fact that ARM was not strengthened.

Revised Rating

Substantial

OBJECTIVE 2

Objective

To reduce household vulnerability in targeted areas.

Rationale

According to the theory of change, rice production intensification activities, improved irrigation and drainage systems, watershed protection activities, and technical assistance to sustainably manage irrigation infrastructure were expected to increase the irrigated and drained rice production areas and increase the rice yield per ha. The Cash-for-Work Program was expected to provide temporary employment and income to crisis-affected communities in chronically food-insecure areas and communities affected by national disaster while at the same time improving small-scale infrastructure. This, in turn was expected to increase the number of people that benefitted from the program. The locust prevention and control activities were expected to increase the area treated against locusts, hence avoid a locust invasion that would have destroyed the harvest. Finally, operationalization and training of emergency response agencies, disaster risk management capacity strengthening, and the installation of early warning systems were expected to enable people to protect themselves from disasters and provide relief. All these activities were to reduce household vulnerability in the targeted areas.

Outputs

The following outputs were achieved during the life of the project to meet objective 2 (ICR, paras 29 to 34 and annex 1):



- 337 rice intensification sub-projects carried out, which benefitted 20,820 smallholders, including 42 percent women.
- 126 rice irrigation and drainage rehabilitation sub-projects carried out in areas affected by cyclones, benefitting 17,500 people.
- 257 watershed protection sub-projects carried out, which benefitted 19,035 people, including 32 percent women. According to the ICR (para 32), these activities were expected to contribute to increased rice yields by reducing the rate of siltation in the irrigation and drainage canals, although the impacts were not immediate.
- 5,064 ha with improved irrigation and drainage services, compared to an original target of 6,000 ha.
- Institutional, organizational, and technical assistance to the water users' associations, which laid the foundation for sustainable management of irrigation infrastructure (ICR, para 32).
- 984 Cash-for-Work sub-projects completed, compared to an original target of 996.
- 70,771 people participated in the consultations for the Cash-for-Work Program, which is significantly higher than the original target of 48,000 people. The 2016 RP (page 25) explains that this was due to underestimation at appraisal.
- 3,299,394 person-days of employment created under the Cash-for-Work Program, which is significantly lower than the original target of 4,400,000.
- Locust control center and pesticide warehouse constructed, but there are concerns regarding the safe handling of pesticides (for details see section 11).
- 476,100 liter of pesticides for the locust invasion campaign delivered, compared to an original target of 238,000 liter.
- 1,617 flying hours contracted to spray the pesticides, which is significantly higher than the original target of 935 hours.
- 10 training on locust prevention carried out in line with the original target.

The task team pointed out that the following outputs:

- Emergency and rescue equipment, such as hose lines, embarkation and nautical equipment, rescue equipment, rehabilitation of rescue equipment storage room, for four regional emergency agencies, which cover the territory of 30 communes. This is significantly lower than the original target of "30 emergency response agencies fully equipped and functional", which meant to equip 30 emergency response agencies at commune level.
- Rehabilitation of the hydro-meteorology network monitoring systems and enhancement of the EWS.
- Cutting-edge Public Weather Service software and server for weather-related prediction and information for the National Weather Agency (DGM) and training. This was critical because the DGM is the agency responsible for cyclone early warning in the country.
- Five Automatic Weather Systems for the decentralized DGM units and rehabilitation of flood EWS of the Water Agency.
- Equipment of communes with sirens, radio, warning flags and boards.

Outcomes

The efficacy of this objective under the original indicators and targets is rated substantial.



The original targets were reached or nearly reached for most of the outputs. In terms of outcomes, an area of 970,265 ha was protected against the locust invasion in three years, which is significantly higher than the original target of 534,000 ha. According to the ICR (para 31), this made it possible to control the locust invasion, which had led to the declaration of a national disaster in 2012. It also laid the foundations to strengthen the locust control center, which has subsequently received support under the Emergency Food Security and Social Protection Project (P147514).

Rice yields in the targeted areas increased from 2.5 tons/ha to 4.8 tons/ha (according to the task team), slightly exceeding the original target of 4.5 tons/ha. This was due to the rice production intensification activities, rehabilitation/construction of more resilient irrigation and drainage infrastructure, and watershed management.

172 communes had operational flood and cyclone EWSs, which is significantly higher than the original target of 70.

With 98,500 beneficiaries, the Cash-for-Work Program missed its original outcome target of 124,000 beneficiaries by about 30 percent. These beneficiaries included 62,604 women, which is in line with the original target.

Rating

Substantial

OBJECTIVE 2 REVISION 1

Revised Objective

To reduce household vulnerability in targeted areas.

Revised Rationale

The projects theory of change remained unchanged since only the ambition of the project related to objective 2 was reduced.

Outputs

The following outputs were achieved during the life of the project to meet objective 2 (ICR, paras 29 to 34 and annex 1):



- 337 rice intensification sub-projects carried out, which benefitted 20,820 smallholders, including 42 percent women.
- 126 rice irrigation and drainage rehabilitation sub-projects carried out in areas affected by cyclones, benefitting 17,500 people.
- 257 watershed protection sub-projects carried out, which benefitted 19,035 people, including 32 percent women.
- 5,064 ha with improved irrigation and drainage services, compared to an initially revised target of 5,200 ha and a final revised target of 4,900.
- Institutional, organizational, and technical assistance to the water users' associations.
- 984 Cash-for-Work sub-projects completed, compared to an original target of 996.
- 70,771 people participated in the consultations for the Cash-for-Work Program, which is significantly higher than the revised target of 57,000 people.
- 3,299,394 person-days of employment created under the Cash-for-Work Program, which is slightly lower than the revised target of 3,600,000.
- Locust control center and pesticide warehouse constructed, but there were concerns regarding the safe handling of pesticides (for details see section 11).
- 476,100 liter of pesticides for the locust invasion campaign delivered, compared to an revised target of 398,300 liter.
- 1,617 flying hours contracted to spray the pesticides, which is significantly higher than the revised target of 1,289 hours.
- 10 training on locust prevention carried out in line with the original target.

The task team noted that the following outputs:

- Emergency and rescue equipment, such as hose lines, embarkation and nautical equipment, rescue equipment, rehabilitation of rescue equipment storage room, for four regional emergency agencies, covering 30 communes. This is in line with the revised target of "30 communes covered by the emergency interventions of four regional equipped structures".
- Rehabilitation of the hydro-meteorology network monitoring systems and enhancement of the EWS.
- Cutting-edge Public Weather Service software and server for weather-related prediction and information for the National Weather Agency (DGM) and training. This was critical because the DGM is the agency responsible for cyclone early warning in the country.
- Five Automatic Weather Systems for the decentralized DGM units and rehabilitation of flood EWS of the Water Agency.
- Equipment of communes with sirens, radio, warning flags and boards.

Outcomes

The efficacy of this objective under the revised indicators and targets is rated high.

Two output targets were substantially achieved, while the others were exceeded. In terms of outcomes, an area of 970,265 ha was protected against the locust invasion in three years, which is significantly higher



than the revised target of 759,500 ha. Rice yields in the targeted areas increased from 2.5 tons/ha to 4.8 tons/ha (according to the task team), slightly exceeding the original target of 4.5 tons/ha. The final number of beneficiaries of the Cash-for-Work Program of 98,500 exceeded the revised target of 91,000 beneficiaries. Similarly, with 62,604 female beneficiaries the revised outcome target of 45,500 women was largely exceeded. Finally, 172 communes were covered by operational flood and cyclone EWSs, which is significantly higher than the original target of 70.

Revised Rating

High

Rationale

Under the original indicators and targets, the first objective was achieved with modest shortcomings mainly in the road sector. The second objective was substantially achieved with minor shortcomings only in terms of beneficiaries of the cash-for-work program. Overall, the project almost fully achieved its objectives, and the efficacy is rated substantial.

Under the revised indicators and targets, the first objective was achieved with minor shortcomings in the road sector. For the second objective, all outcome targets were exceeded. On balance, given the minor shortcomings in the road sector, the efficacy is rated substantial.

Overall Efficacy Rating

Substantial

5. Efficiency

Economic Efficiency

According to the EPP (pages 14, 15 and annex 10), at appraisal, no cost-benefit analysis was carried out for the project as a whole due to the short project preparation time frame and the limited availability of data. Instead, the EPP summarized the main economic benefits of the project and justified the economic soundness of the different sub-components mainly by citing the economic analyses and rates of returns obtained through similar investment.

These main economic benefits included the following: (i) preserving and rehabilitating critical road links to improve access to markets and open up areas with high agricultural production, (ii) increasing revenues for rural households by strengthening their agricultural production capacity and safeguarding their food security, (iii)



providing income earning opportunities for vulnerable households through cash-for-work programs, (iv) improving the ability of vulnerable populations to engage in productive activities by rehabilitating health facilities and water and sanitation systems, and (v) improving the capacity of public agencies and communities to anticipate and respond to weather-related natural catastrophes.

For Sub-component B.1 Preservation of Productive Capacity in Agriculture, a simplified cost-benefit analysis was carried out that yielded a net present value (NVP) of US\$2.9 million and an internal rate of return (IRR) of 15.5 percent, considering an investment life of 25 years (EPP, page 132).

By project end, a quantitative ex-post economic analysis was carried out for road works in two corridors under sub-component A.1: Transport Lifeline Infrastructure Rehabilitation for a total cost of US\$36.32 million. This represented 75 percent of the investment cost of this sub-component and 39 percent of the total project cost at closure.

The analysis used the Highway Development and Management-4 (HDM-4) and applied a cost saving approach. The longer of the two corridors, which included bridge and pavement works, was divided into three sections, which were assumed to be quasi-homogeneous in terms of geometry, traffic characteristics, and roughness over their entire segment. For the second corridor, consisting of bridge works only, one homogenous section was used. The estimated cost and benefit streams under the with and without project scenarios were generated at a discount rate of 12 percent over 20 years.

The key assumptions included (i) a four-year rehabilitation period, (ii) an annual traffic growth rate of 3 percent, (iii) a salvage value of 15 percent of each bridge, and (iv) a standard conversion factor from financial to economic costs of 0.8. For the corridor including pavement works, the International Roughness Index (IRI) after rehabilitation was assumed to vary between 2 and 3, with the upper bound (IRI = 3) partially reflecting observations from the field. The pre-intervention IRI was estimated to be 8 and 10. These assumptions appear reasonable.

For the longer corridor, the analysis showed an economic internal rate of return (EIRR) of 26.7 percent with a pre-intervention IRI of 8 and of 33 percent with a pre-intervention IRI of 10. For the shorter corridor, the analysis showed an EIRR of 41 percent. Sensitivity analyses were carried out, which showed EIRRs above the discount rate of 12 percent for all hypotheses tested.

For Sub-component B.1 Preservation of Productive Capacity in Agriculture, a back-of-the-envelope calculation was carried out. On the basis of this analysis, the task team concluded that the NPV and the IRR were somewhat higher than at appraisal and that the investment was economically viable (ICR, page 58).



For the other subcomponents, the ICR (pages 57 and 58) identifies the number of beneficiaries and provides a qualitative assessment of the main benefits. For instance, under sub-component A.2: Rehabilitation of Community-level Basic Infrastructure, 223 projects were implemented for a total cost of US\$8.55 million. These investments consisted of the rehabilitation of schools, health centers, trails, and small bridges. The average cost per beneficiary was US\$17.10.

Administrative efficiency

The project was extended by one year because of delays mainly in the transport-related activities. The construction of one bridge took 20 instead of eight months due to inefficient contract management, lack of resources on site, contractual disputes between the contractor and the supervision consultant, and bad weather conditions (ICR, page 27). The two substantial project restructurings were necessary mainly because of circumstances not known at appraisal, including the triggering of the zero-sum Disaster Recovery Contingency Funds and the devaluation of the SDR. The project scope was slightly reduced due to higher bridge rehabilitation costs than anticipated at appraisal (the final engineering design were prepared during project implementation) and increases in the wages paid under the cash-for-work program. As seen in section 2, the project has an undisbursed balance of US\$1.84 million (about 2 percent of the project cost).

Although there were some shortcoming in terms of administrative efficiency, the economic rate of return is adequate, and the overall efficiency is rated substantial.

Note: The ICR EIRR estimate for the project of 28.22 shown below is the average of the EIRR of the two road corridors weighted by the investment cost of each corridor.

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		0	0 <input type="checkbox"/> Not Applicable
ICR Estimate	✓	28.22	39.00 <input type="checkbox"/> Not Applicable



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

6. Outcome

Under the original indicators and targets, considering the high relevance of the objectives and the substantial efficiency and efficacy together with the fact that there were moderate shortcomings in the achievement of the first objective and minor shortcomings in the second objective, the overall outcome is rated moderately satisfactory (4). Under the revised indicators and targets, based on the high relevance and the substantial efficacy and efficacy, the overall outcome is rated satisfactory (5). Based on a disbursement of US\$70.57 million (corresponding to 75.28 percent of the total project cost) on June 17, 2016, when the restructuring was approved, the overall outcome rating is moderately satisfactory (4.25 rounded down to 4).

a. Outcome Rating

Moderately Satisfactory

7. Risk to Development Outcome

The main risks to development outcome include the following:

- **Lack of road maintenance:** The country lacks a maintenance culture and adequate maintenance of the rehabilitated infrastructure and other small scale investments, such as the disaster response and rescue equipment and the EWSs, is at risk (ICR, page 32). The Road Maintenance Fund is not systematically and in full recovering the taxes collected from fuel companies, has governance challenges, and the current maintenance budget allocations are too low (ICR, para 27, page 17). The task team also pointed out that in addition to the limited financial resources, inadequate maintenance is due to a lack of a strong asset management strategy.
- **Lack of sustainability of systems and reforms:** The sustainability of new initiatives, such as the introduction and use of the EWS, and the materialization of much-needed reforms in ARM due to a lack of resources and political will are also questionable. In this respect, the ICR (para 82) points out that, in the transport sector specifically, institutional reforms introduced more than a decade ago are still fragile, with the financial and administrative autonomy of ARM often being questioned by political leaders and a need for better governance.
- **Natural disasters:** Future natural disasters also might impact the project outcomes despite the resilient construction standards used under this project.
- **Discontinuation of cash-for-work program:** The task team pointed out that the National Productive Safety Net Program constitutes an improved version of the cash-for-work program and that the latter is now only used for national disaster responses.
- **Continued use of weighing stations:** Enforcement of weight limits is difficult in many countries. The ICR (para 27, page 17) indicates that the operation of the weighing stations under the project was successful and that despite an initial opposition by oil and gas transport lobbies, the close collaboration with the local administration and the police ensured that weight limits were enforced. The task team confirmed that the mobile weighing stations acquired under the project are



successfully used near other bridges not yet rehabilitated and that other donors have replicated the scheme.

8. Assessment of Bank Performance

a. Quality-at-Entry

The project design was based on an integrated, multisector approach, which required substantial coordination among the sectors. The ICR (para 78) credits this multisector design approach not only for reducing transaction costs, but also bringing together sectors, which usually work in silos, and having them collaborate in a more integrated manner without any sector being left behind.

The design was largely guided by past and ongoing operations in Madagascar, such as the Emergency Food Security and Reconstruction Project, which successfully implemented a cash-for-work program and the Adaptable Program Loans series in the transport sector, which started in 2000 and introduced institutional reforms, including the creation of ARM. The project was prepared in close coordination with the other development partners (EPP, pages 1 and 2).

Project preparation involved a large team, and was consistent with the Bank's fiduciary and safeguards requirements (ICR, para 78). Given the multisector approach and the crisis context in the country, a high risk rating was justified. The risks identified and the respective mitigation measures presented in the EPP (page 5) were largely adequate.

Being an emergency operation, project preparation was carried out rapidly. Despite this, the EPP presents a comprehensive preparation effort based on largely solid background analyses. There were, however, shortcomings. The M&E design was weak (see section 9). In addition, according to the ICR (para 58), the selection of the road sections to be intervened was mainly empirical and not supported by an ex-ante economic analysis. This shortcoming was partially mitigated because the existing engineering studies were updated before launching the procurement of the works. Finally, the design of the cash-for-work program and the disaster risk management sub-components were not sufficiently sound from the outset and needed to be revised during project implementation.

Quality-at-Entry Rating

Moderately Satisfactory



b. Quality of supervision

Supervision missions were carried out by a multisector team, and the team leader and key team members were based in the country. This enabled the Bank to quickly respond to and support the client. As an example, the ICR (para 63) mentions that the Bank supervision team was able to respond in a timely manner to the client's request for support to the locust invasion.

According to the ICR (para 79), the Bank supervision was effective and sufficient budget and staff resources were allocated. The task team understood the low capacity and fragile political and economic environment under which the client operated. Joint implementation support missions were carried out twice a year and there were also regular sector-specific supervision missions.

The task team had a positive and problem-solving attitude and, among others, helped (i) reduce delays in the implementation of bridge works through increased supervision, (i) solve the land conflict, and (iii) manage the serious fiduciary issues (ICR para 80).

The ICR (para 64) points out that, in addition to the studies carried out during implementation, the Bank team should have insisted on additional economic analyses/engineering studies to re-assess the cost and type of road/bridge rehabilitation works needed and prioritize interventions across sectors based on quantitative data. This would also have enabled the Bank team to provide recommendations on suitable rehabilitation practices to sustain the investments given that the RN4 road corridor showed severe road degradation after the rehabilitation works.

Although the M&E framework was restructured twice, the changes mainly related to target values. The quality of the outcome indicators to measure the achievement of objective 1 was not approved.

Quality of Supervision Rating

Satisfactory

Overall Bank Performance Rating

Moderately Satisfactory

9. M&E Design, Implementation, & Utilization

a. M&E Design



The design of the M&E system had a number of shortcomings. According to the ICR (paras 56 to 58), several indicators targets were not realistically set at appraisal and the physically investment provision for disaster risk management was not targeted adequately. Only one indicator, the average rice yield per ha, was actually an outcome indicator. The others measured outputs or beneficiaries.

The two outcome indicators for objective 1 "to preserve key lifeline infrastructure" were not directly linked to this objective, and hence not adequate to measure its achievement. The first of these outcome indicators captured the direct project beneficiaries, which according to the EPP (pages 46 and 47) and the ICR (page 37) originally measured the "people living around the project's main interventions, including the EWSs". Knowing how many people benefited from the project does not say anything about achieving the objective of "preserving key lifeline infrastructure". In addition, not all people living around the main project interventions were beneficiaries of preserved key lifeline infrastructure because some of the interventions did not focus on key lifeline infrastructure. With the 2016 restructuring, the link between the indicator and the first objective was further weakened by considering "all people living in the project area of interventions", defined as Madagascar's North-West, as direct project beneficiaries (2016 RP, page 9).

The second outcome indicator consisted of the share of the rural population with access to an all-season road, which measured the proportion of rural people in the project area who lived within 2 km of an all-season road. The project also meant to measure the absolute number of rural people with access to an all-season road, i.e. the numerator of the share, as supplemental data (EPP, page 49). Although these indicators are linked to the rural road rehabilitation activity because rehabilitating rural roads was expected to upgrade these roads to all-season roads, and hence provide access to more people, rural road rehabilitation was only a minor activity under Sub-component A.2 Rehabilitation of Community-Level Basic Infrastructure. In addition, the indicator was not measurable in the Madagascan context. It was dropped with the 2016 restructuring and replaced by an indicator capturing the number of people in rural areas (fokontany), who gained access to an all-season road through rural roads rehabilitation. The revised indicator had the same limitations as the original indicators in terms of measurability of objective 1.

Several other indicators lacked a clear definition and a methodology to measure them. Other shortcomings pointed out in the ICR (paras 66 to 68) include (i) lack of relevance, for instance in the case of emergency response agencies fully equipped and functional, (ii) the use of inadequate units of measurement in the case of road rehabilitation works, for which the total length of roads in km was captured instead of the number and nature of spot improvements over such length, and (iii) inaccurate estimation of beneficiaries and participants in consultation activities at appraisal.

While the results framework was revised in the 2013 restructuring and nearly all targets or indicators were changed during the 2016 restructuring, most shortcomings pointed out above were not corrected.



M&E monitoring was the responsibility of the project coordination unit, which was to have a monitoring specialist in the team. Inputs for M&E were expected to come from all implementation agencies.

b. M&E Implementation

According to the task team, data collection was done by the four implementation units with the support of the implementation agency. Each Bank sector specialist discussed the monitoring data with the respective implementation unit. During the joint supervision missions, the Bank team discussed the monitoring and evaluation data for the project as a whole. The ICR (para 71) points out that M&E data was regularly shared with all project parties through the progress reports. It was also reported in the aide memoires and ISRs. Given the shortcomings in M&E design, data collection for certain indicators was difficult.

c. M&E Utilization

The project parties used the M&E data to verify the progress in achieving the project outputs. The M&E data was instrumental for the project restructurings. However, since the indicators were mostly output-related, the M&E data did not provide quantitative evidence on the achievement of most outcomes.

M&E Quality Rating

Modest

10. Other Issues

a. Safeguards

The project was classified as category B for environmental assessment purposes because its environmental and social impacts were expected to be moderate, site-specific, and manageable to an acceptable level. The following safeguard policies were triggered: OP/BP 4.01 (Environmental Assessment), OP 4.09 (Pest Management), OP/BP 4.11 (Physical Cultural Resources), OP/BP 4.12 (Involuntary Resettlement), and OP/BP 4.37 (Safety of Dams). The project restructurings did not change the safeguards classification and did not trigger new safeguards policies.

Given the rapid response and emergency nature of this project, only an Environmental and Social Screening and Assessment Framework was prepared at appraisal to guide the preparation of the safeguards instruments during project implementation. The task team pointed out that for all subprojects Environment and Social Impact Assessments, Resettlement Action Plans, and Environment and Social Management Plans were prepared. According to the ICR (para 75), before the start of the locust invasion response, a specific Integrated Pest Management Plan was developed, which required the preparation of a Health and Environmental Management or an Environmental and Social Management Plan. Again, the



task team confirmed that this Health and Environmental Management Plan was prepared and applied in a satisfactory manner.

The ICR (para 75) mentions that most roads and bridge works were carried out within the existing right of way, and there were no significant problems. For other infrastructure works, squatting on state-owned properties was frequent and occupants were relocated and/or compensated. Environmental and social safeguards were largely complied with by the different government agencies, and the environmental audit performed at the end of the project did not highlight major issues.

However, the ICR (paras 61 and 62) reports two critical safeguard incidents. The first consisted of a dispute over part of the land on which ARM was constructing a weighing station. The Bank team only became aware about this dispute towards project end when the dispute was already in court. The task team asked ARM to stop the works, and the land boundaries for the weighing station were changed to avoid potential impacts and further litigation.

The other issue related to the locust invasion response activity, where thousands of empty barrels of pesticides disappeared. These barrels had not yet been safely disposed because of delays by the Food and Agriculture Organization in acquiring the disposal equipment financed under the project. Because of fears that the barrels could have been used to transport water to the South, which was facing an El Nino drought, an emergency search and information campaign were launched, but the barrels have not been found.

b. Fiduciary Compliance

The ICR (para 76) states that the different implementation agencies handled procurement and financial management issues in a moderately satisfactory way. The task team pointed out that the Borrower submitted timely and satisfactory Interim Financial Reports. The financial audit reports were also timely and had unqualified opinions.

There was an allegation of fraud under the sub-component A.1: Rehabilitation of Transport Lifeline Infrastructure, implemented by ARM. An in-depth fiduciary review confirmed that some of the irregularities had been corrected (ICR, para 76). For the other irregularities, the respective expenses of about US\$22,000 were declared as ineligible. According to the task team, these expenses were reimbursed after project closure. The task team explained that the expenditures were ineligible because (i) the procurement plan and procedures were not followed, (ii) supporting documentation was missing, (iii) internal control measures and financial management best practices were not followed, and (i) they were not reasonable. The Bank team reported the case to the Integrity Vice Presidency.



c. Unintended impacts (Positive or Negative)

d. Other

11. Ratings

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

12. Lessons

The following are three key lessons from the ICR (para 85) with some adaption in language:

- **Multi-sectorial projects can be a good tool to address regional development challenges, especially in poor and fragile countries.** With limited funds available and multiple needs, the approach under the project helped address the priority needs in various sectors. In addition, the approach was more efficient in terms of project preparation efforts and costs. It is also likely to have a greater impact because all sectoral interventions were concentrated in the same area instead of being fragmented and dispersed. This multisector project constituted to some extent an integrated regional development approach linked to the regional development objectives highlighted in country's policy documents.
- **Involving experienced project implementation agencies and having strong leadership is a critical success factor for multi-sectorial projects.** According to the task team, the implementation agencies under this project had already experience in implementing World Bank projects. This experience was essential to manage the different priorities and achieve positive results and learning. In addition, the difficulty to find a common interest in



the project beyond each specific sector was overcome through strong project implementation leadership.

- **Data collection and results measuring need strengthening.** Monitoring and evaluation under the project had shortcomings and experienced difficulties. In addition, the country lacks the quantitative data to measure medium to long-term outcomes of this type of multisector projects. Therefore, the collection of data, for instance, on traffic, population impacted, incomes, and vulnerability, would ease the preparation, implementation, and evaluation of future projects. It would also help in the government's decision-making process. Furthermore, for future projects, funds should be allocated to undertake an impact evaluation or some less costly survey work. This would enable to better understand the potential impacts of this type of projects on poverty and the people's lives. Although this lesson, as formulated, is specific to Madagascar, it is applicable to many other countries.

13. Assessment Recommended?

Yes

Please Explain

This is a multisector project with many different activities that was relatively successfully implemented. Therefore, it constitutes a learning opportunity for other projects.

14. Comments on Quality of ICR

The ICR is candid and frankly presents several serious problems that occurred during project implementation. The ICR provides a good critique of the M&E design, and makes an effort to demonstrate efficiency despite the lack of baseline information.

The ICR provides the results chains for the project as originally designed and with the revisions. These results chains mainly associate the activities and outputs under the first component with the first objective and the respective indicators and the ones under the second component with the second objective and the respective indicators. It gives limited consideration to the fact that some of the activities impact both objectives. It also dwells very little on outcomes. When assessing the project's efficacy, the ICR does not follow the logic of a results chain, focusing on outcomes. Instead, it describes the activities carried out, outputs achieved, and problems encountered by components and sub-components. The ICR does not provide a complete overview of all main project outputs, and it is difficult to understand what the project has focused on in the disaster management and agriculture sectors and in institutional terms.



The ICR has no details on financial management reporting. It also contains limited information on the safeguards documents prepared during project implementation and on the compliance with procurement rules and procedures.

The cost reporting is incomplete and inaccurate, with limited information on cost overruns and factors that determined the available credit amounts during implementation found in different parts of the document. The ICR contains errors in reporting indicators baselines, changes in target values, and the overall risk level of the project. Although the ICR presents many lessons and recommendations, some of them are not clear, such as the lesson on experienced implementation agencies. Finally, the document would have benefitted from editing.

Based on the above, the quality of the ICR is considered barely substantial.

a. Quality of ICR Rating
Substantial