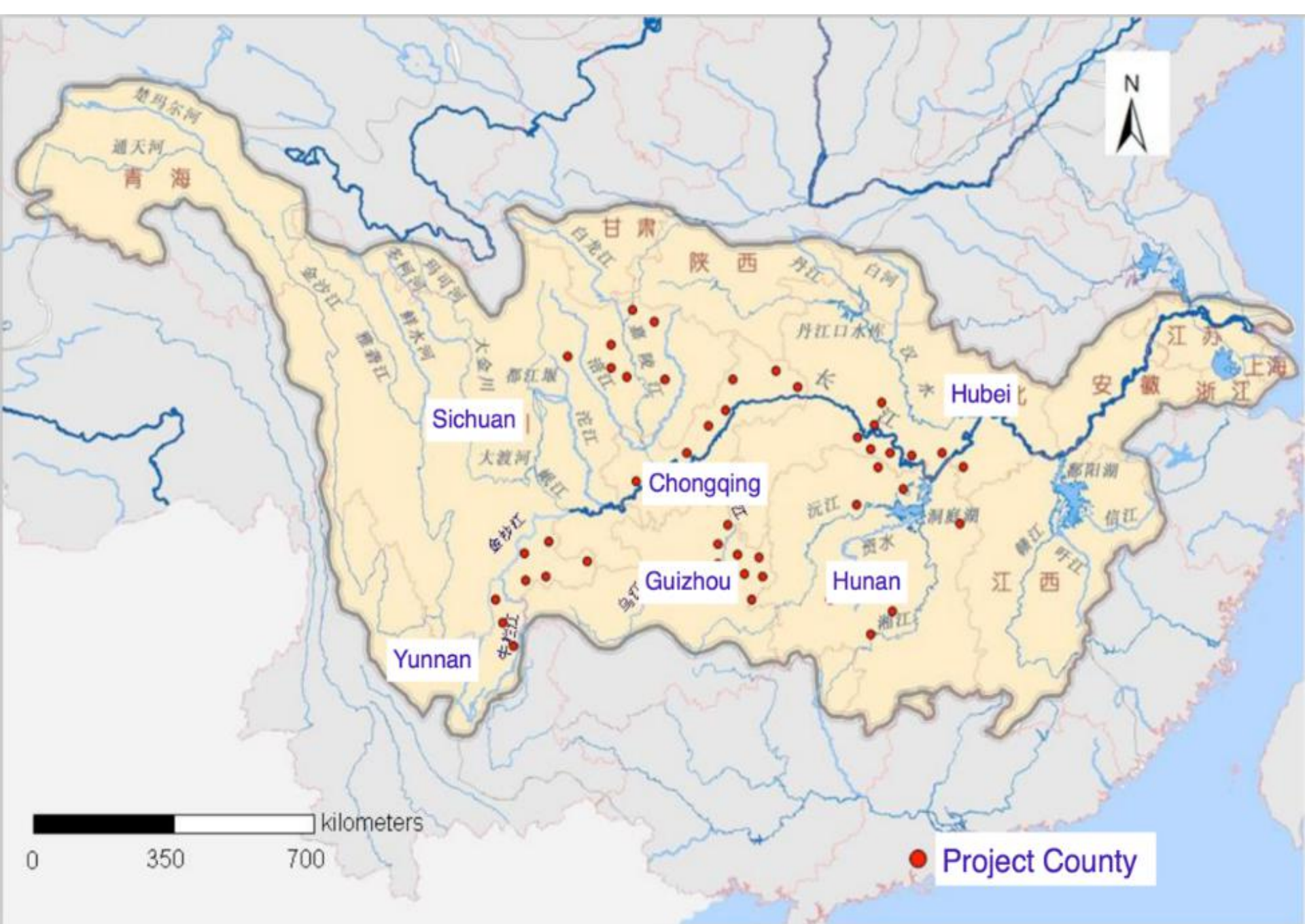


# **Environmental Management Plan** **/环境管理计划**

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# Potential Environmental Benefits 正面环境效益

## 1. Estimated reduced use of fertilizers: 减少化肥使用

		Hubei	Hunan	Chongqing	Sichuan	Guizhou	Yunnan	TOTAL
Rate								
N	Before	237	405	386	426	243	258	322
	After	190	284	280	376	218	203	248
	Change	-20%	-30%	-28%	-12%	-10%	-21%	-23%
P <sub>2</sub> O <sub>5</sub>	Before	119	176	208	229	111	90	142
	After	99	128	148	172	97	74	110
	Change	-17%	-27%	-29%	-25%	-13%	-18%	-23%
K <sub>2</sub> O	Before	128	204	304	258	126	86	164
	After	107	175	235	220	119	86	144
	Change	-16%	-14%	-23%	-15%	-5%	-1%	-13%
Quantity								
N	Before	2,037	7,642	2,965	1,830	1,071	5,710	21,253
	After	1,635	6,404	2,147	1,612	960	4,503	17,262
	Change	-20%	-16%	-28%	-12%	-10%	-21%	-16%
P <sub>2</sub> O <sub>5</sub>	Before	1,019	3,315	1,596	983	490	1,993	9,396
	After	851	2,896	1,133	740	426	1,634	7,680
	Change	-17%	-13%	-29%	-25%	-13%	-18%	-18%
K <sub>2</sub> O	Before	1,096	3,859	2,336	1,109	554	1,896	10,850
	After	917	3,952	1,802	946	524	1,875	10,016
	Change	-16%	2%	-23%	-15%	-5%	-1%	-8%

## 2. Estimated reduced use of pesticides: 减少农药使用

	Hubei	Hunan	Chongqing	Sichuan	Guizhou	Yunnan	TOTAL
Rate							
Before	6.63	8.4	7.03	5.84	4.14	3.12	5.82
After	4.76	5.95	5.66	4.76	3.48	2.68	4.55
Change	-25%	-29%	-19%	-18%	-16%	-14%	-22%
Quantity							
Before	57.8	158.7	54	25.1	18.2	70.1	383.9
After	43.5	134.5	43.5	20.4	15.3	60.2	317.4
Change	-25%	-15%	-19%	-18%	-16%	-14%	-17%

### 3. Estimated reduction of water use: 减少水资源使用

Province	Current available water ( $\times 10^4$ m <sup>3</sup> )	Water used for irrigation before project ( $\times 10^4$ m <sup>3</sup> )	Water used for irrigation after the project ( $\times 10^4$ m <sup>3</sup> )	Change of water used for irrigation due to project	Proportion of water use change in available water
Hubei	5,810	3,498	3,302	-5.6%	-3.4%
Hunan	29,096	11,250	12,323	+9.5%	+3.7%
Chongqing	1,839	1,443	1,666	+15.5%	+12.1%
Sichuan	9,654	8,214	8,592	+4.6%	+3.9%
Guizhou	6,455	3,769	3,211	-14.8%	-8.6%
Yunnan	41,840	5,324	4,463	-16.1%	-2.1%
TOTAL	94,694	33,499	33,557	+0.2%	+0.06%

### 3. Reduction of soil erosion and soil nutrients loss : 减少水土流失

Project Activities	Hubei	Hunan	Chongqing	Sichuan	Guizhou	Yunnan	Total
Slope to terrace	7,226	0	21,622	32,599	647	8,277	63,145
Economic forest	4,782	28,196	144,418	44,716	15,855	76,156	309,340
Conservative tillage	0	0	0	12,210	0	0	12,210
Ecological forest	912	28,196	3,454	135,229	0	157,137	324,016
Riverbank protection and slope protection	4,822	1468	0	1,595	1,892	0	4,719
Total	17,742	57,859	169,494	226,349	18,394	241,570	731,408

# Potential Impacts and Mitigation Measures

## 潜在环境影响与减缓措施

### Pre-construction

- EIA and FSR: Site selection criteria, not national reserve; public consultation
- Building & construction preparation: documents development (RFP, TOR for bidders, contracts, information release, grievance redress office established, training of PMO staffs, loan implementation engaged in QCBS)

## Construction phase

- Soil erosion
- Water pollution
- Air pollution
- Noise
- Solid wastes
- Health
- Impacts on flora
- Social and cultural considerations



## Operational phase

- Soil erosion
- Water availability and quality
- Solid wastes
- Solid salinity
- Impacts on flora
- Environmental risks

## Capacity building

- Training materials development
- Training of trainers, staffs and farmers

# Environmental Monitoring and Inspection

## 环境监测与核查方案

	Parameters指标	Location, Time and Frequency地点、时间与频率	Implementing Agency实施单位	Supervising Agency监督机构
<b>Construction Phase建设阶段</b>				
<b>1. Standard construction impacts建设活动</b>	Soil erosion, water pollution, air emissions, noise, solid waste, vegetation土壤侵蚀、水污染、空气污染物、噪声、固体废弃物、植被	Construction sites, regular visual inspections as needed建设地点, 根据需要进行定期目测检查	IAs, County / city PMO 实施单位, 县级项目办	Provincial PMO, Central PMO中央和省级项目办
<b>2. Surface water availability地表水数量与供应</b>	Water allocation, water balance水资源平衡与分配	Actual water flows at upstream, intakes, and downstream. 上游、下游的水资源数量以及建设地点的水利用	IAs, County / city PMO 实施单位, 县级项目办	Provincial PMO, Central PMO中央和省级项目办
<b>3. Surface water quality地表水质量</b>	pH, SS, BOD, COD, total salt, NH <sub>3</sub> -N, nitrate, TN, TP, pesticides, coliform总盐度、氨氮、硝酸盐、总氮、总磷、农药、大肠菌群	Downstream of each irrigation district, once each year, 3 samples per quarterly monitoring session. Particular attention to be paid to: Hubei湖北: Dangyang当阳 Hunan湖南: Nanxian, Lixian, Taoyuan, Dongkou南县、澧县、桃源、洞口 Chongqing重庆: Wanzhou, Wulong, Wuxi万州、武隆、巫溪 Sichuan四川: Wangcang, Anzhou旺苍、安州 Guizhou贵州: all the 8 counties所有8个县灌溉区的下游, 每个季度3个抽样和监测, 每年报告。重点观测点如下。	IAs, County / city PMO 实施单位, 县级项目办	Provincial PMO, Central PMO中央和省级项目办
<b>4. Community annoyances对社区影响</b>	Dust, noise and traffic jams粉尘、噪音、交通拥挤	Large construction sites; visual inspection on a regular basis大型建设点, 定期目测检查	OEE, county / city PMO 现场环境工程师、县级项目办	Provincial PMO省级项目办
<b>5. Soil and vegetation土壤与植被</b>	Removal of vegetation and exposed surface植被破坏与地标裸露	All sites; visual inspection during site visits. Particular attention to be paid to: Guizhou: Jiulongdong National reserve. 所有建设点, 定期目测检查, 特别注意贵州的九龙洞自然保护区	OEE, county / city PMO 现场环境工程师、县级项目办	Provincial PMO省级项目办

	Parameters指标	Location, Time and Frequency地点、时间与频率	Implementing Agency实施单位	Supervising Agency监督机构
<b>Operation Phase实施阶段</b>				
<b>1. Surface water availability</b> 地表水供应与数量	Water allocation, water balance水平衡与分配	Actual water flows at upstream, intakes, and downstream.上游、下游的水资源数量以及建设地点的水利用。特别注意下面几个县。 Particular attention to be paid to: Chongqing: all the 7 counties. Hunan: Shuangfeng, Lixian, Hengnan, Dongkou, Lengshuitan Sichuan: Zhaohua, Yinshan	County / city PMO 县级项目办	Provincial PMO, Central PMO中央和省级项目办
<b>2. Surface water quality</b> 地表水质	pH, SS, BOD, COD, total salt, NH <sub>3</sub> -N, nitrate, TN, TP, pesticides, coliform pH, SS, BOD, COD、总盐度、氨氮、硝酸盐、总氮、总磷、农药、大肠菌群	Downstream of each irrigation district, once each year, 3 samples per quarterly monitoring session. Particular attention to be paid to:灌溉区的下游, 每个季度3个抽样和监测, 每年报告。重点观测点如下。 Hubei湖北: Dangyang当阳 Hunan湖南: Nanxian, Lixian, Taoyuan, Dongkou南县、澧县、桃源、洞口 Chongqing重庆: Wanzhou, Wulong, Wuxi万州、武隆、巫溪 Sichuan四川: Wangcang, Anzhou旺苍、安州 Guizhou贵州: all the 8 counties所有8个县	County / city PMO 县级项目办	Provincial PMO, Central PMO中央和省级项目办
<b>3. Environmental quality</b> 环境质量	Amount of chemical fertilizer N, P <sub>2</sub> O <sub>5</sub> Amount of pesticides. 化肥数量-折合成N和P <sub>2</sub> O <sub>5</sub>	All project sites所有项目点	County / city PMO 县级项目办	Provincial PMO, Central PMO中央和省级项目办

- **Internal monitoring and inspection.** During construction, the IA, with support from the PMOs at the provincial and city levels, will conduct internal environmental monitoring and visual inspections to ensure that environmental mitigation measures are properly implemented. Inspections will mainly cover construction activities, but these will also review the affected environment. The inspections will be conducted regularly as needed. During the operational period, IA will be responsible for internal monitoring and reporting to the EA.
- 内部监督与核查：项目建设阶段，在省级和县级项目办的支持下，实施单位进行内部监督与现场目测检查，确保环境减缓措施得到妥善执行。内部监督将针对建设活动，以及受影响的环境。内部监督将根据需要定期进行。在项目实施阶段，项目实施单位将负责内部监督并向项目执行机构报告。

- **Independent environmental monitoring.** The environmental monitoring stations (EMS) at the county levels, supported by the Environmental Protection Bureau at provincial levels, conduct independent environmental monitoring of the project. The results of the environmental monitoring will be attached to the semi-annual progress report that will be submitted to ADB and the EA.
- **独立环境监测：**在省级环保局的支持下，县级环境监测站负责项目的环境监测。监测报告将以附件的形式，附在向亚行和执行机构提交的半年报告。

- Environmental monitoring, including environmental benefits monitoring, will be incorporated into the project performance management system (PPMS). The PPMS will be designed to allow adequate flexibility to adopt remedial actions regarding project design, schedules, activities, and development impacts. At the beginning of the project, IAs will work with the PMOs to develop the initial PPMS, including the procedures to systematically generate data on project component inputs and outputs, and agree on environmental and related social economic indicators to be used to measure project impacts. The PMOs and the IAs will refine the PPMS framework, confirm achievable goals, firm up monitoring and recording arrangements, and establish systems and procedures no later than 6 months after loan effectiveness.
- 环境监测，包括环境效益监测，将整合到项目评估管理系统PPMS中。PPMS将充分考虑项目特点、进度、活动和影响，采取污染控制措施。项目开始阶段，实施单位与项目办一起编制初始的PPMS，包括项目各项活动、投入、产出相关的数据收集、工作程序，以及评估项目影响的相关环境和社会、经济指标。贷款生效6个月内，项目办和实施单位确定PPMS的框架，确定可达到目标，确定监督和数据记录等工作安排，完成监测系统和工作程序。

- The monitoring results will be used to evaluate: (i) the extent and severity of environmental impacts compared with the predicted impacts, (ii) performance of the environmental protection measures or compliance with related rules and regulations, (iii) impact trends, and (iv) the overall effectiveness of the EMPs. The effectiveness of the mitigation measures and monitoring plans will be evaluated through a feedback reporting system. The measures required by the EMPs will be modified if necessary.
- 监测报告，用于评估：1）与预期环境影响相比，实际产生的环境影响程度，2）环保措施的效果以及与相关标准和法规的符合程度，3）环境影响发展趋势，4）环境管理计划总的效果。环保措施和监测计划的效果将通过反馈报告系统进行评估。如果需要，环境管理计划要求的措施可以进行调整。

# Public Consultation 公众参与

- **Public consultation during project preparation.** Various public consultations were conducted in the course of the preparation of the feasibility study reports and the EIA report. During the feasibility study reports, the respective municipal governments were consulted to assist in site and process selections. During the EIA, a questionnaire survey of more than 1198 respondents has been conducted. Project information has been posted on the internet at the start of the EIA for the purpose of identifying environmental issues of concern to the general public; and the draft EIA has been posted on the internet to solicit public comments. The main focuses of public consultations were to assess the environmental impacts of the proposed components on nearby residents and mitigation measures, as well as resettlement issues. These activities were carried out in accordance with MEP Interim Guidelines on Public Participation in Environmental Impact Assessment (2015), and the ADB Safeguard Policy Statement (2009).
- 项目准备阶段的公众参与：分发1198份调查问卷，绝大部分欢迎本项目。通过座谈会的形式也进行了调查。

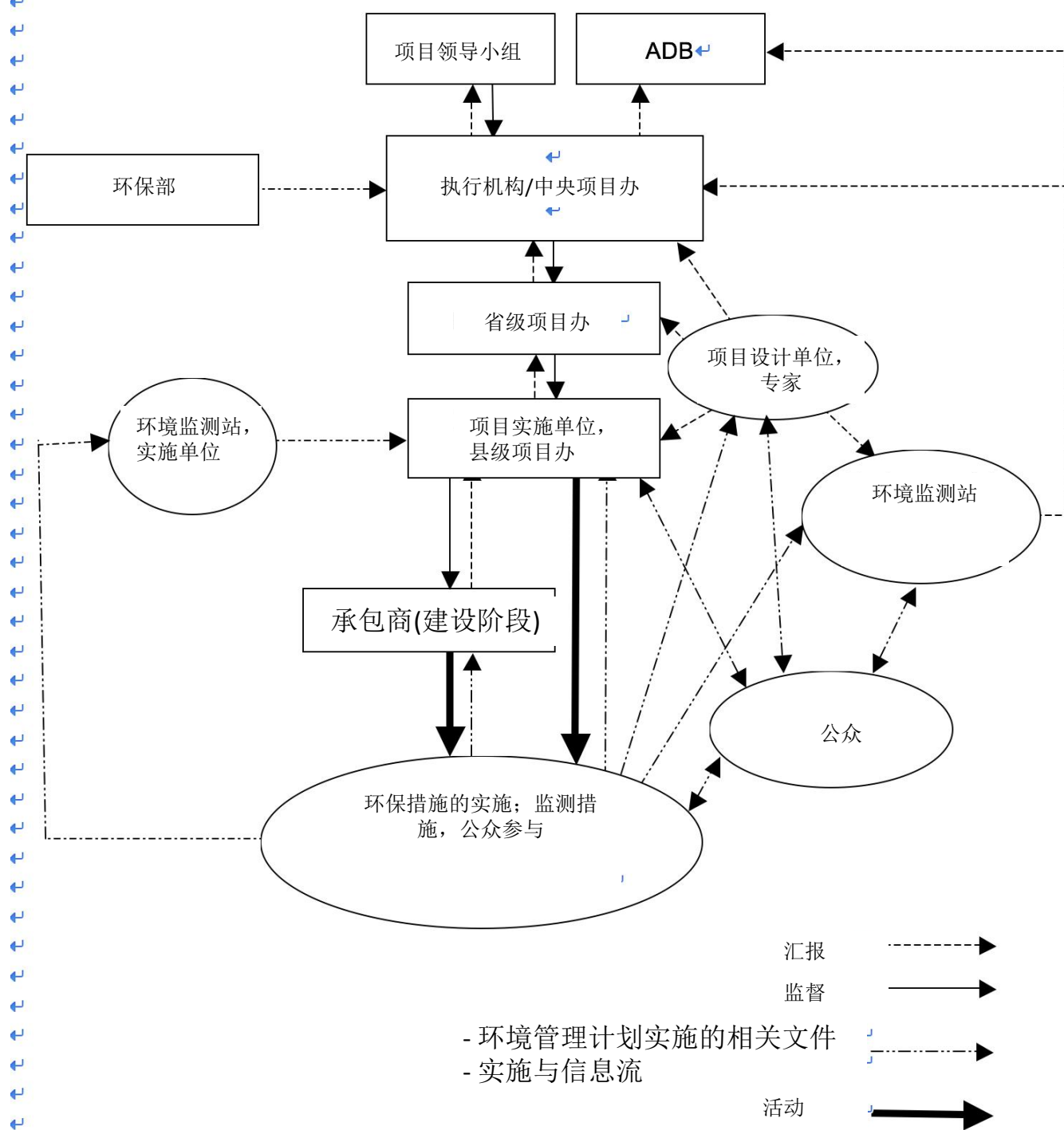


- **Future public consultation plan.** Future plans for public involvement during the design, construction, and operational phases were developed during project preparation. They include several types of consultations, e.g., site visits, workshops, investigation of specific issues, interviews, and public hearings.
- 项目建设和实施阶段的公众参与：通过座谈会、现场调查、对具体事情调查等形式充分调查公众对于本项目的意见和建议。

- Public participation plans are part of the project implementation and management plan. The IAs are responsible for public participation during project implementation. The IAs will also establish an environmental management unit for supervising implementation, continuing public consultation, monitoring progress, and responding to grievances. The staff at the offices will be well trained to handle crisis situations or conflicts with residents due to distress from environmental impacts. Costs for public participation activities during project construction will be estimated when the domestic EIA is finalized. Costs for public participation activities will be covered by the IAs. In addition, a feedback and adjustment mechanism (**Figure A.1**) will be established to ensure timely feedback and measures to address any concerns raised by the project-affected communities.
- 公众参与是项目实施和管理的重要内容。项目实施单位负责公众参与。项目实施单位将组建一个环境管理小组，负责实施和监督公众参与，解决相关纠纷。相关人员将进行培训，提高与环境污染或者影响相关的解决危机事件或者与公众冲突时间。相关费用将在国内环评和可研报告中体现。公众参与的相关费用支出将有项目实施单位承担。另外，也制定了反馈和调节机制，确保相关问题发生后，得到解释的反馈和处理。

## Public Consultation Program 公众参与计划

Organizer 组织方	Approach/Times 方式、频度	Subjects 内容	Participants 参加人
<b>A. Construction 项目建设阶段</b>			
County / city PMOs, IAs 县项目办, 实施单位	Public consultation and site visits: at least once per year 公众参与和项目点走访: 至少每年一次	Adjusting mitigation measures if necessary, 如需要调整环保措施 construction impacts, 环境影响 comments and suggestions 意见和建议	Residents within project area 项目区居民
	Public information session: at least once per year 信息公布活动: 至少每年一次	Adjusting mitigation measures if necessary, 如需要调整环保措施 construction impacts, 环境影响 comments and suggestions 意见和建议	Representatives of beneficiary farmers and social sectors 受益农户或受益方的代表
<b>B. Operation 项目实施阶段</b>			
IAs 实施单位	Public opinion survey: once per year in the first 5 years of operation 公众意见调查: 每年一次	Effects of mitigation measures, 环保措施的效果 impacts of operation, 实施的影响 comments, and suggestions for corrective actions 意见和建议	Beneficiary farmers 受益农民



# Reporting and Supervision汇报和监督

**Internal monitoring reports.** During the construction period, internal monitoring will be conducted by the county / city PMO. The internal monitoring reports will summarize: (i) environmental issues during construction; (ii) mitigation measures taken, if any; and (iii) consequences of the impacts on the environment and/or surrounding communities.

1 The contractors will be trained to take immediate actions to remedy unexpected adverse impacts or ineffective or inefficient mitigation measures, as required by the EMPs. The IAs will also respond to these reports in order to ensure that contractors have taken appropriate and timely action. Additional measures may be taken, if needed, to ensure that all issues raised by the reports are appropriately addressed.

**2 External environmental monitoring reports.** The CPMO is responsible for monitoring and assessing overall project activities under the project design and monitoring framework (DMF), and will be accountable to ADB for ensuring effective implementation of the EMPs. The CPMO will be assisted by the loan implementation consultancy recruited through international competitive bidding to fulfil its environmental supervision, monitoring and reporting obligations to ADB and the EA. The environmental monitoring reports will be submitted to ADB and CPMO on a semi-annual basis. The reports will emphasize: (i) progress made in implementing the EMPs, (ii) implementation of mitigation measures, (iii) environmental compliance, (iv) institutional strengthening and training, (v) public consultations, and (vi) problems experienced and resultant corrective actions. ADB may request that further environmental mitigation actions be taken, as it deems necessary, and may determine further mitigation measures for different stages, if necessary.

内部监督报告。项目建设阶段，县（市）项目办负责完成内部监督，监督报告包括1）建设过程中的环境问题，2）采取的环保措施，3）对环境和社区的影响和后果。

1. 将培训合同相关方，立即采取措施降低负面环境影响，解决无效措施。实施单位将对这些报告进行反馈，确保合同相关方采取及时有效措施。
2. 外部环境监测报告：中央项目办将根据项目设计和监督框架（DMF），总体负责项目的监督和评估，并向亚行承诺保证环境管理计划的有效实施。通过国际招标获得贷款实施咨询的支持，中央项目办进行环境监督、监测以及向亚行和执行机构汇报。环境监测报告每半年向亚行和中央项目办提交一次。报告主要包括，1）实施环境管理计划的进度，2）环保措施的实施，3）环境符合程度，4）机构能力提升和培训，5）公众咨询，6）发现问题以及采取整改措施。如需要，亚行可能要求采取其他必要的环境污染防治措施，并根据不同阶段的情况决定采取进一步的污染防治措施。

# Institutional Strengthening and Training 机构能力提升与培训

Activity 活动	Target Agencies/Attendees 针对对象	Contents 内容	Timing 时间
<b>Strengthening 能力提升</b>			
<b>Institutional strengthening 机构加强</b>	PMOs, IAs, EPBs 项目办、实施单位、环保局	Defining institutional arrangements for environmental management, monitoring, and supervision 环境管理、监督和监督的机构安排 Defining positions and responsibilities 人员机构和责任安排 Appointing and recruiting personnel 人员制定和任用安排	During project preparation 项目准备
<b>Environmental management clauses and protocols 环境管理规定和工作方案</b>	IAs 实施单位	Developing environmental management clauses and incorporating them into construction and operational contracts 制定管理管理规定，纳入建设和实施合同 Developing and refining environmental monitoring protocols 环境监测工作方案制定和完善 Developing environmental emergency response procedures 制定紧急环境事件反馈程序	During project preparation 项目准备
<b>Training 培训</b>			
<b>Environmental laws, regulations, and policies 环境法律、法规和政策</b>	PMOs, IAs, contractors 项目办、实施单位、合同相关方	Environmental laws and regulations 环境法律法规 Environmental policies and plans 环境政策和计划 Basic environmental management 基本环境管理 Environmental emergency response 紧急环境事件反馈	Prior to project implementation 项目实施前
<b>EMP implementation 环境管理计划实施</b>	PMOs, contractors 项目办、合同相关方	Responsibility and duties for project construction, management and environmental protection 项目建设、管理和环保的指责和责任 Environmental protection tasks in project construction 项目建设过程中的环保任务 Key environmental protection measures during construction 项目建设过程中的重要环节保护措施 EMP improvement and corrective actions 环境管理计划的完善和整改措施	Prior to and during project implementation 项目实施前、实施过程中
<b>Training of trainers 对培训人员的培训</b>	Local agricultural extension centers 当地农业技术推广机构	BFA, IPM, water-saving irrigation, and organic farming 配方施肥、病虫害综合防治、节水灌溉、生态农业	At the start of project implementation 项目实施开始的时候
<b>Training of local farmers 对农民培训</b>	Local farmers 农民	BFA, IPM, water-saving irrigation, and organic farming 配方施肥、病虫害综合防治、节水灌溉、生态农业	At the start of and during project implementation 项目实施开始的时候、实施过程中
<b>Environmental safeguards policies 环境安保政策</b>	IAs, local EPBs, contractors 实施单位、地方环保局、合同相关方	ADB and national environmental safeguards policies and regulations 亚行和国内环保政策法规 Environmental reporting requirements 环境汇报规定	Prior to and during project implementation 项目实施前、实施过程中

## Environmental Reporting Plan环境报告计划

Reports报告		From报告 完成单位	To汇报给	Frequency频度
<b>Construction Phase建设阶段</b>				
<b>Internal monitoring内部监督</b>	Internal monitoring report 内部监督报告	Contractors 合同相关方	County / city PMO县项目办	<b>Monthly每月</b>
	Internal monitoring report 内部监测报告	IAs实施单位	County / city PMO县项目办	<b>Quarterly每季度</b>
<b>External monitoring外部监测</b>	External monitoring report 外部监测报告	EMS环境监测站	ADB, CPMO, PPMO and county / city PMO亚行、中 央项目办、省项目办、县项 目办	<b>Semi-annual每半年</b>
<b>Operational Phase实施阶段</b>				
<b>Internal monitoring内部监测</b>	Internal monitoring report 内部监测报告	IAs, EMS实 施单位, 环 境监测站	ADB, CPMO, PPMO, county / city PMO亚行、中央项目办、 省项目办、县项目办	<b>Semi-annual for the first 3 years of operation实施前3年 里每半年</b>