ASSOCIATED PROGRAMME ON FLOOD MANAGEMENT

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EFFECTIVENESS OF FLOOD MANAGEMENT MEASURES

Global Water Partnership

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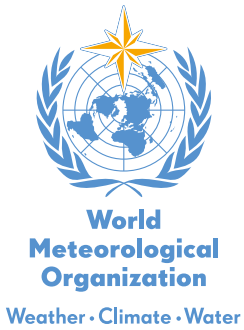
The **Associated Programme on Flood Management** (APFM) is a joint initiative of the World Meteorological Organization (WMO) and the Global Water Partnership (GWP).

It promotes the concept of Integrated Flood Management (IFM) as a new approach to flood management. The programme is financially supported by the Federal Office for the Environment of Switzerland (FOEN), the French Ministry of Foreign Affairs and International Development, the National Water Commission of Mexico (CONAGUA) and the U.S. Agency for International Development (USAID).

www.floodmanagement.info



The **World Meteorological Organization** is a specialized agency of the United Nations. It is the UN system's authoritative voice on the state and behaviour of the Earth's atmosphere, its interaction with the oceans, the climate it produces and the resulting distribution of water resources.

It co-ordinates the meteorological and hydrological services of 191 countries and territories.

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Integrated Flood Management Tools Series No.21 version 1.0

To the reader

This publication is part of the *"Integrated Flood Management Tools Series"* being compiled by the Associated Programme on Flood Management. The *Effectiveness of Flood Management Measures* Tool is based on available literature and draws on the findings from relevant works wherever possible.

This Tool addresses the needs of practitioners and allows them to easily access relevant guidance materials. The Tool is considered as a resource guide/material for practitioners and not an academic paper. References used are mostly available on the Internet and hyperlinks are provided in the *References* section.

This Tool is a *"living document"* and will be updated based on sharing of experiences with its readers. The Associated Programme on Flood Management encourages flood managers and related experts engaged in the evaluation and auditing of flood management programs around the globe to participate in the enrichment of the Tool. For this purpose, comments and other inputs are cordially invited. Authorship and contributions will be appropriately acknowledged. Please kindly submit your inputs to the following email address: apfm@wmo.int under Subject: *"Effectiveness of Flood Management Measures"*.

Acknowledgements

This Tool makes use of the work of many organizations and experts as listed in the references. Special acknowledgements are due to Dr John Labadie for his competent expertise and for bringing various perspectives into focus under technical guidance of the APFM Technical Support Unit.

Disclaimer

CONTENTS

1 INTRODUCTION, INCLUDING SCOPE AND STRUCTURE

1 It is not enough to assert—to an elected official, a regulator, a donor organization or the taxpayer—that one's organization is doing an effective job of flood management. One also has to be able to provide a credible answer to the question: *"How do you know?"*

2 There is a multiplicity of flood management activities that can be pursued by a plethora of government jurisdictions, government agencies, NGOs, private and volunteer groups—independently, in cooperation, in competition. These activities may include: constructing flood prevention infrastructure; rebuilding houses, buildings and infrastructure; restoring communications infrastructure; providing loans, credits, technical assistance; strengthening disaster mitigation efforts such as disaster preparedness and risk reduction, early warning and prevention and watershed management; developing or re-constituting institutional capacity for flood management and governance; training in process and methods.

3 While some financial accounting paradigm is usually applied to such projects, there is rarely any systematic consideration of whether these lengthy projects actually achieve the goals for which they were implemented. A lot of money gets spent, but one does not always know why.

4 Governance of organizations and activities has been, and continues to be, the subject of considerable debate in Europe, Asia, Australia and North America. So, too, has been the issue of transparency—of information, decision-making, documentation and results. Considering the often large amounts of money invested in flood management planning and implementation, it is imperative to ensure that those funds are well spent and that both accountability and transparency are robust at every phase of the process.

5 The monitoring and evaluation of the flood management process can be significantly enhanced by applying the principles and practices of auditing and evaluation to provide objective assurance that systems of governance, including risk management, operational performance and financial control, are actually working. That is, auditing and assessment can help to determine whether:

- Financial and operational information, for both internal and external use, is reliable and credible;
- Operations are performed efficiently and effectively;
- Assets are safeguarded; and
- Actions and decisions comply with laws, regulations and contracts.

6 This document (as part of the Flood Management Tools Series) focuses on the evaluation of flood management measures, including both the preparedness for and prevention of floods and seeks to establish a balanced approach between the two. In addition, the evaluation of Integrated Flood Management (IFM) programs must be addressed within the context of climate change adaptation, as IFM is increasingly being seen as one of a number of adaptive strategies in dealing with climate change effects. IFM efforts must be evaluated not only in their own right, but in terms of how well they form part of a community-wide, holistic adaptation response to climate change.

7 Companion documents in the *APFM Flood Management Tools Series* address such topics as climate science and predictions, flood characteristics, risk management, emergency planning and the like. Other APFM publications provide information and analysis regarding economic, social and legal aspects of flood management. Information and insight from these publications and from other sources will be incorporated or referenced here throughout to provide examples or illustrations.

8 The intended audience for this document includes those who are active in flood management, flood prevention, recovery and emergency management, especially those who are charged with ensuring the effectiveness and efficiency of flood management measures and programs. The intent of this document is to provide useful guidance for urban officials, planners, emergency managers, flood management practitioners, NGOs, business leaders, civil society organizations, community organizations and other stakeholders with a vested interest in effective flood management.

9 **Section 2** provides a context for linking flood management with climate change adaptation and discusses the value of incorporating the growing body of evaluation models for adaptation activities into the flood management arena. **Section 3** defines the concepts and terms used in program evaluation and it identifies some of the international norms and standards that guide the application of evaluation programs. **Section 4** explores the process of linking flood effects with the types of indicators that will form the core of an evaluation process. **Section 5** examines the process of data collection—an integral part of any evaluation process—and linking data to indicators. It also identifies a number of evaluation and analysis tools, discussing their advantages and shortcomings in the context of flood management evaluation. **Section 6** presents the process of creating a flood management evaluation program plan and shows how to prepare a project-specific or activity-specific evaluation/audit plan. This section is supplemented by three **Appendices** that provide guidance standards and plan exemplars. **Section 7** provides a summary and conclusion.

2 EFFECTIVENESS OF FLOOD MANAGEMENT MEASURES, FRAMEWORK AND CONTEXT

10 The evaluation function lies somewhere in the middle ground between management and execution and its role is often misunderstood. An evaluator can tell you if there are problems, but cannot decide whether those problems are acceptable to management in their current condition or whether management is willing to accept the risk of those problems continuing to be problems or whether/how management wishes to decide how best to fix the problems. Only management can answer those questions.

11 An evaluator can tell you if there are problems, but an evaluator cannot tell you who should fix the problems or how they should be fixed. Nor can the evaluator explain why a particular problem has not yet been fixed. An evaluator cannot tell you what has happened between one audit (of a facility, function or process) and the next and an evaluator cannot tell you definitively why the same problem shows up from one audit to the next. These are issues for management to address.

12 Then what can an evaluator do for you? An evaluator can provide you with a credible basis for assuring anyone who asks that you are systematically keeping track of what your program does, that you are doing things correctly and that you are taking action to correct/improve things where necessary. An evaluator can help you by:

- identifying risks (that no one may have noticed) and assessing the possible impacts of those risks on the organization;
- identifying where risk management processes are not being followed;
- suggesting strategies for managing risk (aka internal controls); and

– determining whether internal controls are effective. If nothing else, an evaluation program helps to minimize any misalignment between policy and implementation.

2.1 Integrated flood management and climate change adaptation

13 As much as IFM is embedded securely within the processes and requirements of Integrated Water Resources Management **(IWRM)**, it is even more firmly fixed within the imperatives and processes of climate change adaptation (WMO, 2012). Actions taken to enhance flood management—whether prevention or preparedness—must fit within and support the community's overall long-term efforts to deal with climate change effects. Flood management programs must contribute to the overall well-being of the community and not lead to mal-adaptive outcomes. Flood management—and, by extension, assessment and evaluation of flood management measures—is not a stand-alone activity and should be carried out referring to the implementation and assessment of adaptation measures. It is useful, therefore, to seek guidance and a framework for flood management assessment from parallel activities within the climate change adaptation assessment models.

14 The WMO Integrated Flood Management Concept Paper places IFM squarely within the context of climate change adaptation, noting that "adaptation planning under the United Nations Framework on Climate Change and other frameworks for climate change adaptation assign flood management as a priority." It goes on to say that IFM/IWRM should engage stakeholders at all levels in an effort to implement an adaptive management paradigm, bolstered by a process of systematic monitoring and evaluation to improve and adapt management policies, strategies and practices (WMO 2009).

2.2 Current models of flood management assessment and evaluation

15 A review of WMO and other literature reveals a dearth of information regarding assessment and evaluation of flood management programs and projects. The IFM Tool No.10 (WMO, 2011) provides a rich fund of case studies regarding the use of IFM as a climate change adaptation tool, but it does not address any aspect of evaluating results. The *Overview Situation Paper on Flood Management Practices* (WMO, 2005) identifies the need for post-flood reviews and disaster impact assessment as a basis for improvements, but it notes that, however powerful and useful such appraisals may be, they are under-used. A European Commission report (EU, 2005) described a river basin approach for European water policy and clearly linked it to flood management. It further recognized the importance of post-event analysis as a means of tailoring policies, improving methods and identifying indirect damages that had not been anticipated. It emphasized the need to develop and use common methodologies, particularly in data collection, to ensure homogeneity and comparability. There are a number of audit/assessment reports on specific flood management projects around the world that have taken place over the last 10-15 years. These reports generally describe the results of the audit and suggest improvements, but they do not offer much guidance or information about how the audit was conducted or how to develop and conduct an auditing or assessment program.

> *Some evaluation efforts regarding flood management are contained within adaptation-related assessments: So far, adaptation audits have examined only short-term adaptation efforts such as emergency planning or flood defences. For example, the SAI of the United Republic of Tanzania examined how well national and regional agencies have implemented the national strategic guidance on disaster management, in particular regarding prevention and reduction of floods. The audit concluded that there is a high risk that possible future floods will cause further damage in the country, owing to an absence of strategic disaster management planning and a lack of preparedness in handling disasters, including a lack of coordination, among regional and local authorities.*
> (UNFCCC, 2010).

2.3 Assessment and evaluation for adaptation models

16 In contrast to the relative paucity of guidance for developing flood management evaluation protocols, there is a moderate but growing literature regarding the assessment and evaluation of adaptations strategies, programs and projects. Researchers and practitioners in the field of adaptation have been confronting and examining the need for evaluation mechanisms and they have been developing evaluation programs suitable to the long-term and diverse nature of the adaptation experience.

> *(...) early adaptation projects conducted through the finance mechanisms of the United Nations Framework Convention on Climate Change (UNFCCC), namely the Global Environment Facility (GEF) Special Climate Change Fund (SCCF) and Least Developed Countries Fund (LDCF), have developed numerous studies and results frameworks for adaptation. GEF's Adaptation Monitoring and Assessment Tool, the World Bank Pilot Project in Climate Resilience results framework and the Adaptation Fund Board (AFB) results framework are also very recent efforts to guide practitioners in developing adaptation-relevant monitoring and evaluation systems*
> (Spearman and McGray, 2011).

17 Practitioners understand that evaluation of projects, policies and programs is an integral part of the adaptation process. Success will be measured by how effective adaptation measures are at reducing vulnerability and building resilience. Identification of lessons learned, good practices, gaps and further improvements will contribute to the continuous improvement of adaptation programs. Put another way,

> *Given the complexity and long-term nature of climate change, it is essential that adaptation be designed as a continuous and flexible process and subjected to periodic review. The implementation of adaptation needs to be monitored, evaluated regularly and revised in terms of both the validity of the underlying scientific assumptions and the appropriateness of projects, policies and programmes, including their effectiveness, efficiency and overall utility*
> (UNFCCC, 2010).

18 (Spearman and McGary, 2011) directly address the challenges in creating and implementing an effective evaluation program for adaptation programs:

- The costs of doing evaluation well;
- Long time frames (20-50 years);
- A high degree of uncertainty regarding climate change effects;

- Different definitions of adaptive success;
- The problem of counterfactuals—evaluating success in the absence of a negative event.

19 These challenges would play a large part in any flood management evaluation program, especially as flood management efforts are being incorporated into a community's adaptation efforts. Results-based Management (RBM) is becoming a common model for managing adaptation programs and it is supported, in part, by a robust evaluation process. The evaluation process tends to focus on quantitative metrics, but the trend lately is to incorporate qualitative indicators as well. This trend will no doubt apply to flood program evaluation as metrics (such as linear feet of flood wall, number of hectares protected from flood waters or reduction in casualties) make room for additional, less-quantifiable indicators (such as improvement in economic conditions resulting from flood protection measures, increases in adaptive capacity). Since the basic principles of evaluation and assessment are the same, the evaluation of flood management activities has much to gain by adopting and tailoring the models, lessons learned and protocols already under development and scrutiny in the climate change adaptation field.

20 Assessment of flood management performance and outcomes is particularly important. Without it, one may have spent money properly and honestly but not know whether one has achieved the intended result. More than anything else, assessment and auditing are about expectations and accountability. Citizens, taxpayers, stakeholders and beneficiaries want to know that their expenditures—not only in money, but also in time, effort, suffering and emotional capital—will result in something better.

3 CONCEPTS AND DEFINITIONS

It is important to gain clarity and precision regarding a number of terms and concepts prevalent in the field of evaluation and assessment.

3.1 Terms and Definitions

21 There are four important terms that are often used interchangeably but are different in both definition and implementation (UNDP, 2009; GEF, 2010; OECD, 2010):

A | Monitoring

22 Monitoring is a continuous or periodic function that uses systematic collection of data, qualitative and quantitative, for the purposes of keeping activities on track. It is primarily a management tool that uses systematic collection of data on specified indicators to inform managers and stakeholders regarding progress (or lack thereof) toward the achievement of objectives and use of funds. Monitoring efforts may be directed at measuring implementation activities (particularly quantitative parameters) or it can be used to determine if a project or program is progressing toward desired goals. Mid-course improvements or corrections may be based on monitoring results

B | Evaluation

23 An evaluation is an evidence-based, systematic and impartial assessment of an activity, project, program, strategy, policy, sector, focal area or other topic. The purpose of evaluation is to determine the relevance and fulfillment of objectives, development efficiency, effectiveness impact and sustainability. Evaluation differs from monitoring in that evaluations are done independently to provide managers and staff with an objective assessment of whether or not

they are on track. They are also more rigorous in their procedures, design and methodology and they generally involve more extensive analysis. Types of evaluations include:

- Program or project-level evaluations
- Impact evaluations
- Targeted or thematic evaluations
- Process and performance evaluations
- Ad hoc reviews

C | Assessment

24 Assessment is a term used (loosely) to describe or encompass all the other types of activities discussed here—monitoring, evaluation and audit. As seen, it is used in these definitions; it is also used by itself to refer to the overall process of determining the progress, fitness and outcomes of a program or activity. It is a general, rather vague term, whereas the other terms are more specific and focused, with clear protocols and processes.

D | Audit

25 Audits are tools used in the evaluation or assessment process. An audit is an assessment of the adequacy of management controls to ensure the economical and efficient use of resources; the safeguarding of assets; the reliability of financial and other information; the compliance with regulations, rules and established policies; the effectiveness of risk management; and the adequacy of organizational structures, systems and processes. Audits (and, for that matter, evaluations) may be done internally or by an independent third party. Both are equally valid as long as the objectives of the audit are clear and protocols are established to ensure the quality and credibility of the findings.

There are two basic types of audits:

26 **Financial statement audits** provide reasonable assurance about whether the financial statements of an audited entity present fairly the financial position, results of operations and cash flows in conformity with generally accepted accounting principles.

27 Financial-related audits include determining whether:

- financial information is presented in accordance with established or stated criteria,
- the entity has adhered to specific financial compliance requirements or
- the entity's internal control structure over financial reporting and/or safeguarding assets is suitably designed and implemented to achieve the control objectives.

28 A **performance audit** is an objective and systematic examination of evidence for the purpose of providing an independent assessment of the performance of an organization, program, activity or function in order to improve public accountability and facilitate decision-making by

parties with responsibility to oversee or initiate corrective action. Performance auditing includes determining (Labadie, 2008):

- whether the entity is acquiring, protecting and using its resources (such as personnel, property and space) economically and efficiently,
- the causes of inefficiencies or uneconomical practices,
- the extent to which the desired results or benefits established by the government or other authorizing body are being achieved,
- the effectiveness of organizations, programs, activities or functions and
- whether the entity is in compliance with significant laws and regulations applicable to the program.

3.2 *Ex post* and *ex ante* evaluation

29 Evaluations also have a time dimension, that is, before or after the action, project or other intervention. An *ex ante* evaluation is one that is performed before implementation of a project or intervention to identify and estimate values and assumptions regarding effects and costs that then are used as a basis for evaluating the potential performance of alternative strategies. It also helps to identify those indicators or metrics that then can be used in evaluation of actual performance. Environmental Impact Assessments, Social Impact Assessments and Risk Assessments are a variety of assessments that—however important in the planning stages of projects and interventions—will not be addressed in this document.

30 An *ex post* evaluation takes place at the end of a project or at some point in later stages of a project, after actions or interventions have taken place.

> *Ex post evaluation derives added value from past and current practice for the improvement of future flood risk management. To achieve this, the ex post perspective addresses measures and instruments already in place and installed with the aim to reduce flood risk. Based on observable effects, ex post evaluation generates information on criteria such as the achieved effectiveness, efficiency, robustness and flexibility and other criteria*
> (Olfer, 2007).

31 This type of evaluation helps to examine such questions as:

- What impacts or outcomes resulted from a particular intervention?
- To what extent did an action achieve the planned objectives?
- What was the benefit/cost ratio of a particular project element?
- How did the measure or instrument perform under different conditions?
- How robust or adaptable was an action under changing conditions?

3.3 Results-based Management

32 Results-based Management **(RBM)** is a management and process model gaining currency in the climate change adaptation field. GEF is moving to RBM practices in an effort to promote accountability, to focus on results rather than approvals and to enhance learning and knowledge

sharing (GEF, 2010). Other organizations involved in adaptation planning and implementation are also using the RBM model.

> *RBM is concerned with learning, risk management and accountability. Learning not only helps improve results from existing programmes and projects, but also enhances the capacity of the organization and individuals to make better decisions in the future and improves the formulation of future programmes and projects. Since there are no perfect plans, it is essential that managers, staff and stakeholders learn from the successes and failures of each programme or project*
> (UNDP, 2009).

33 Monitoring and evaluation are an integral part of any viable management scheme and RBM is heavily dependent on results-based monitoring and evaluation. RBM guides an organization to plan, measure, monitor, assess, review and report on progress toward desired program objectives and outcomes. Evaluation uses performance information, through a feedback process, to promote adaptive management, organizational learning, evaluation of results achievement and accountability for resources. An evaluation-based RBM builds confidence and credibility among program participants at all levels.

34 An important caveat in implementing an evaluation program—whether in RBM or any other management model—is to be quite explicit about *"attribution"* vs *"contribution."* It is necessary, in any evaluation of outcomes, to determine if an outcome can be attributed (solely) to a specific intervention or action. That is, can a causal link be determined between observed (or expected to be observed) changes and a specific course of action; or is the observed change due to some combination of other circumstances unrelated to the actions considered? It is also possible that a particular action was a contributing factor to the observed outcome in addition to other—equally important—factors. Without understanding this distinction, it will be quite difficult to say with any confidence what has been learned from actions taken in expectation of achieving certain outcomes.

35 This problem becomes more acute when flood management—and the evaluation of flood management activities—becomes integrated into the overall planning and implementation of adaptive strategies against climate change effects.

> *As adaptation entails a range of projects, policies and programmes across sectors and levels, their effect may be difficult to distinguish from the effects of other sectoral activities. Whether or not attribution is important depends on why monitoring and evaluation are being carried out. If indicators are needed in order to show that a particular project, policy or programme has been cost effective, then it will be essential to find ways to attribute measured successes to those individual actions*
> (UNFCCC, 2010).

3.4 Norms and Standards

36 The *Government Auditing Standards* (aka *"the Yellow Book"*), issued by the Comptroller General of the United States, is the guiding reference for audits of U. S. government agencies and is used by many public sector auditors throughout the United States (GAO, 2011). The *International Standards for the Professional Practice of Internal Auditing* (aka *"The Red Book"*) is published by the Institute of Internal Auditors **(IIA)**, an international body representing 100,000 internal auditing

professionals worldwide with 249 Chapters and Institutes in 94 countries (IIA, 2012a). The IIA standards are used by private and public sector auditors in the United States. The American Evaluation Association publishes the Guiding Principles for Evaluators (AEA, 2004). The GEF and its agencies mostly refer to those principles, norms and standards produced by the Evaluation Cooperation Group (**ECG**, www.ecgnet.org) of the international financial institutions and the United Nations Evaluation Group (**UNEG**, www.uneval.org).

37 Regardless of any differences in the institutional outlooks or purview of the sponsoring organizations, all of these standards subscribe to the same basic principles, including:

- Independence of evaluators or auditors from the policy and decision-making process and from the implementation function of the evaluated entity;
- Credibility of the evaluations based on reliable data, information or observation;
- Usefulness of the evaluation finding to the management of the evaluated entity, based on a balanced portfolio of findings, supporting documentation, conclusions and recommendations;
- Impartiality in the balanced presentation of strengths and weaknesses of the evaluated entity;
- Transparency in the conduct of the evaluation and in sources, methodologies and analyses;
- Competence of the evaluators/auditors in the technical, environmental organizational and managerial aspects of the subject area;
- Adherence to ethical principles and absence of conflicts of interest by the evaluators/auditors.

38 Achievement of and adherence to these (or any) standards may be difficult in countries/areas where audit or evaluation organizations are lacking or in situations where flood management activities are carried out in a fragmented manner with no coordinated plans. In such situations, it may be necessary to create an evaluation/audit capability—based on a recognized set of standards—before an audit program can be initiated. At the same time, it may take a while to identify the "client" for any particular set of audit or evaluation activities, especially if local institutions have been significantly impacted by a flood or another disaster.

4 DEVELOPING EVALUATION INDICATORS

39 The heart of any evaluation program comprises the indicators with which one assesses progress, completion, success or compliance (or, regrettably, the opposite). Whether one is evaluating the extent or efficacy of structural flood protection, the effectiveness of flood management policies and processes, conformance with particular standards of practice, compliance with regulatory requirements or contract provisions, one starts from the basis of what the program or project is intended to accomplish. Evaluation then proceeds through a structured process, using the tools and practices discussed in **Section 3**, to analyze and compare actual performance and outcomes with those stipulated in the program/project plan.

4.1 Indicators and objectives

40 Indicators may be straightforward or complex, qualitative or quantitative, objective or definitional or a combination of all of these types. Regarding a project that deals only with structural, technical flood prevention matters, indicators would include parameters such as linear feet of dikes constructed, hectares of land protected from flood waters, acres of wetlands created as a flood buffer and so on. A broader flood management program might be evaluated regarding the creation of a flood warning capability, reduction in the dollar amount of flood damage to dwellings and businesses, development of a flood emergency response plan and the like. Indicators for programs that contribute to or are integrated in climate change adaptation projects may be broader, less precise and more difficult to define. It may be necessary to use surrogate indicators to bridge the gap between flood management activities and adaptation efforts: reduction in numbers of displaced people as an indication of an increase in adaptive capacity, for example.

41 Evaluation indicators should reflect what is important to the project, rather than merely what can easily be measured or what data are readily available. Data accessibility and availability should not be the main criteria when choosing the indicators to be used. Otherwise, one may end up in the position of the man who lost his keys at night in an open field, but searched for them under the street lamp because the light was better there. Also, one must distinguish between evaluating activities (for example number of residents trained in flood preparedness) as opposed to outcomes (as effectiveness of flood-fighting measures). Both can be useful in an evaluation, depending on the project objectives, but it is important to appreciate the distinction. Program planners and managers need to define what "success" is for the project in order to establish benchmarks and criteria—leading to indicators—according to which the project can be evaluated. Evaluation of flood management programs should focus on both direct and indirect effects of floods; both flood prevention and flood preparedness efforts should also be examined. Assessment of all of these factors should be integrated into and support the overall evaluation of flood management contributions to climate change adaptation strategies.

42 Program objectives drive evaluation objectives which, in turn, drive the development of evaluation indicators. In the modern project management parlance, program objectives should be SMART, as explained in (GEF, 2010):

- Specific: The system captures the essence of the desired result by clearly and directly relating to the achievement of an objective and only that objective.
- Measurable: The monitoring system and indicators are unambiguously specified so that all arties agree on what they cover and there are practical ways to measure them.
- Achievable and Attributable: The system identifies what changes are anticipated as a result of the intervention and whether the results are realistic. Attribution requires that changes in the targeted developmental issue can be linked to the intervention.
- Relevant and Realistic: The system establishes levels of performance that are likely to be achieved in a practical manner and that reflect the expectations of stakeholders.
- Time-Bound, Timely, Trackable and Targeted: The system allows progress to be tracked in a cost-effective manner at the desired frequency for a set period, with clear identification of the particular stakeholder group(s) to be affected by the project or program.

43 Evaluation objectives and indicators should likewise be SMART to best reflect and support project objectives. The optimal time to define evaluation objectives and indicators is at the beginning stages of a project, so that all objectives remain clear, consistent and integrated. Embedded within the SMART criteria are a set of requirement that each indicator should satisfy:

- Does the indicator accurately measure or reflect the parameter being examined?
- Is there agreement on exactly what the indicator means or measures?
- Are the data required for this indicator available at reasonable cost and effort?
- Will the indicator be both consistent and reliable over the length of the effort?
- Will the indicator be useful for adaptive management, accountability and development of corrective actions?

44 Indicators that do not satisfy these conditions will not be very useful in gauging the direction, progress or success of the project.

4.2 Direct and indirect flood effects

45 Floods are pervasive in nature having positive as well as negative impact on the overall human well-being. They play a major role in replenishing wetlands, recharging groundwater and support agriculture and fisheries systems, making flood plains preferred areas for human settlements and economic activities. Equally, however, flood events pose a series of diverse health threats, ranging from contaminating water sources to causing catastrophic destruction. Flood damages occur in a large variety of manners, through diverse mechanisms and affect victims in different ways. Flood effects may be both direct—through the immediate interaction of flood water with built, natural and human environments—and indirect—through damage or disruption of transportation and economic activities that impact people's livelihoods. Damage can be further divided into tangible and intangible categories.

46 Direct flood damages cover all varieties of harm which relate to the immediate physical contact of flood water to humans, property and the environment. This includes, for example, damage to buildings, economic assets, loss of standing crops and livestock in agriculture, loss of human life, immediate health impacts and loss of ecological goods. Direct damages are usually measured as damage to stock values.

47 Indirect flood damages are damages caused by disruption of physical and economic linkages of the economy and the extra costs of emergency and other actions taken to prevent flood damage and other losses. This includes, for example, the loss of production of companies affected by the flooding, induced production losses of their suppliers and customers, the costs of traffic disruption or the costs of emergency services. Indirect damages are often measured as loss of flow values.

48 Tangible/intangible damages: damages, which can be easily specified in monetary terms, such as damages on assets, loss of production etc. are called tangible damages. Casualties, health effects or damages to ecological goods and to all kind of goods and services which are not traded in a market are far more difficult to assess in monetary terms. They are therefore indicated as intangibles (Messner et al., 2007). **Figure 1** provides a more detailed view of these losses and categories.

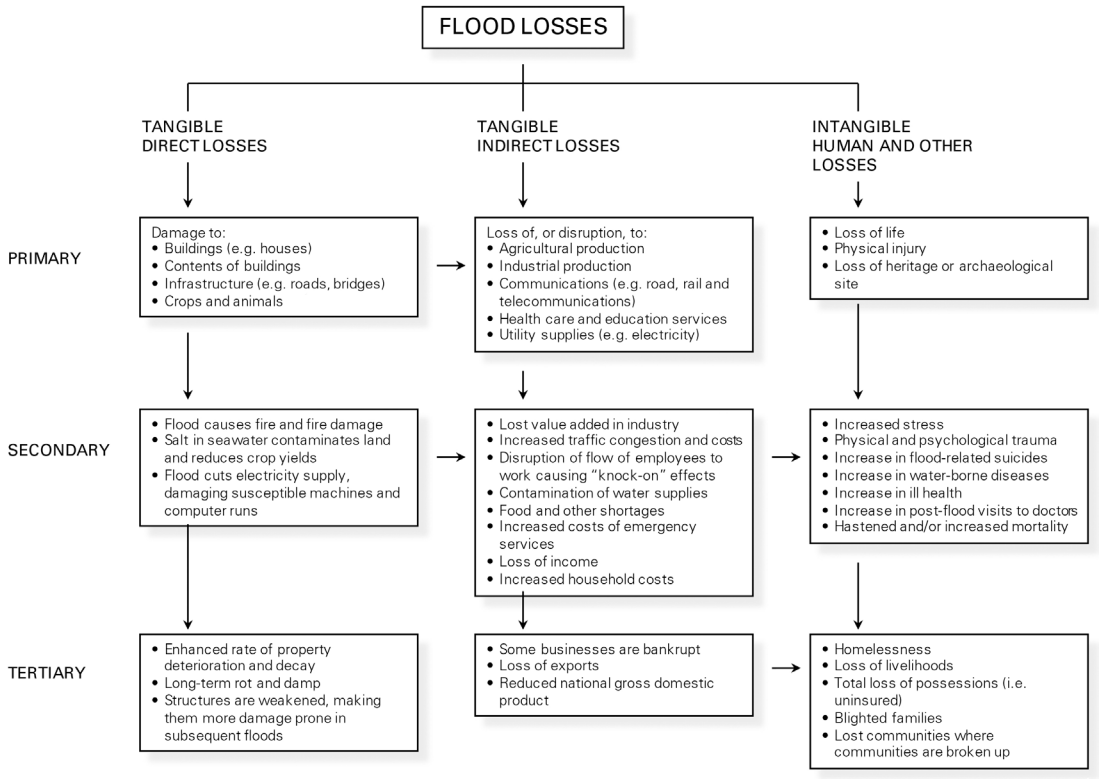

Figure 1 — Categorization of Flood Losses (WMO, 2005)

49 The analysis of indirect economic effects of flooding may need to be modified by additional factors, for example:

- The duration of the flood (several days vs. several weeks);
- Large areal extent of the flood, affecting multiple communities, counties, states, etc.;
- Flood impacts on highly concentrated and/or specialized industry or services;
- A lack of excess capacity in the economy (at full capacity);
- Significant communications networks (transport, energy, information) are seriously affected;
- Manufacturing, commercial or distribution stocks are low.

50 While flood management programs (and, by extension, evaluation of flood programs) have traditionally concentrated on the primary, direct, tangible damage effects, they should address the indirect, secondary/tertiary and intangible losses as well. This takes on greater importance as flood management becomes more integrated with climate change adaptation strategies, programs and projects. From the matrix above, one can clearly see that flood damages are both objective (physically measured) and subjective (personally- and socially-evaluated). It is tempting to stay with the metric-based evaluations, but socially-defined effects are equally important to the community. It may be necessary to establish surrogate measurement values for these effects or at least to agree on how the relative merits of certain flood mitigation measures can be assessed.

4.3 Flood prevention and flood preparedness

51 Flood prevention and flood preparedness are the two main goals of flood management. One might add a third—flood recovery—that proceeds from the first two. Indeed, flood recovery could be considered the first stage of flood prevention and preparedness (for the next flood) in that lessons learned and actions taken during recovery can form the basis for future plans and strategies. In the larger context described in **Section 2** of this document, the primary aim of IFM is mainly to reduce negative impacts of floods and maximize the net benefits from the use of flood plains as an integral element of climate change adaptation planning and implementation. Preventing a flood in one community is not really "successful" if it merely increases flooding in the next downstream portion of the basin or if it induces mal-adaptive behaviors among the population protected (e.g., building in the flood plain supposedly protected by a dike structure).

52 Flood prevention and flood preparedness are, quite properly, interrelated and the dividing line between the two is often rather porous. The current trend toward "living with the flood" may make this distinction even less meaningful. Structural measures, such as constructing dikes and flood walls or improving storm drainage capacity, are clearly aimed a preventing floods in a certain area. Non-structural measures, such as enhancing flood warning systems and developing emergency plans, are clearly preparedness measures. How does one characterize changes in land-use policies and regulations that prevent building in the flood plain? Formerly-inhabited areas are turned into parks or flood buffer zones that allow flood waters to encroach with relatively little damage. Elevating buildings on pilings or raising entrance-door plinths do not prevent the flooding, but they can reduce the extent and nature of the damage caused. The challenge for the evaluator, then, is to examine plans and actions of both kinds and identify indicators—structural, non-structural, direct, indirect, tangible and intangible—that can be used to assess the efficacy of flood management measures.

53 The development and use of indicators is not without potential pitfalls and statistical information must be treated with circumspection. As an example, Asian Development Bank (ADB) presents the following data on their flood control sector project in Indonesia:

> *(...) the Project reduced the adverse impacts of flooding on people living on the south coast of Java. It reduced the flooded area by 24 239 ha, from 39 169 ha before the Project to 14 840 ha with the Project, based on the flood damage data in 2005. Average annual direct flood losses were reduced from Rp 1 076 111 per household at appraisal to Rp 137 435 per household, according to post-implementation analysis. These figures show that, although the implementation of the Project resulted in the reduction of total flooded area by only 62%, direct flood damage was reduced by 87%. (...) The establishment of effective flood management measures also reduced the total number of affected people by 273 526, from 444 210 individuals before the Project to 170 684 with the Project*
>
> *(...) direct benefits include the avoidable (i) flood damage to standing crops, (ii) loss of animals, (iii) flood damage to houses and private belongings and (iv) flood damage to infrastructure and communal buildings. Indirect tangible benefits include the farm income to be obtained from additional crops of paddy grown in areas currently subject to deep flooding every other year and to be reclaimed through river and drainage works. Other indirect benefits are represented by reduced disruption of human activities caused by flooding, estimated at 12% of direct damage to dwellings, 25% of direct damage*

to infrastructure and 10% of direct damage to crops and livestock and by risk aversion estimated at 20% of the direct costs.
(ADB, 2007)

54 There is certainly no reason to assume that any of the information reported is incorrect or even suspect, but evaluators must be aware of the limitations inherent in basing evaluation indicators strictly on data reporting. Estimates of damages prevented are calculations of damages that would have been avoided due to the presence of some type of flood management activity (structural or procedural) protecting part of a floodplain (Comiskey, 2005). Reported flood damages are those actually sustained. Both estimates represent attempts at establishing an estimate of damages caused by flooding.

55 One problem with using estimates of "flood damages prevented" as a performance measure is that they are based, to some extent, on the fact that development in a floodplain would have occurred even if the flood control structure had not been constructed. Thus, damages prevented may be considered a performance measure, since they gauge how much damage was prevented by the presence of a dam or levee. The very presence of such structures may encourage people to build in a flood-prone area, thus negating any contribution that these structures make to the mitigation of flood-induced damage.

56 Accurate flood loss estimates require a concerted effort, based on the availability of substantial resources. If there is no central mechanism (government or private) for reporting flood losses, estimates are likely to be poor or unreliable. Personal losses are usually self-reported and state and municipal losses are often self-insured. Some portion of the cost to repair a washed out road or bridge might be covered in a budget line item for routine maintenance or it may be included as a separate item in the following year's budget. A flood-damaged structure may be replaced by one of higher quality, costing more than the replacement value or the cost to repair the original structure. A governmental entity (i.e., city, county, state, etc.) may decide to forgo repairs altogether or simply remove the structure and not replace it. Some homeowners and businesses will not have insurance or be under-insured. The costs for this sort of repair are almost impossible to estimate. For those that are insured, claims may not fully reflect actual losses. Agricultural losses are also hard to accurately estimate.

57 **Table 1** demonstrates the relationship between project objectives, outcomes and targets. It provides a useful example of how one might identify evaluation indicators. Some of the targets (e.g., land values, damage and relief costs, numbers of commercial and industrial enterprises) are numerical metrics and easily analyzed, assuming that baseline data are available and credible. Other targets (e.g., satisfaction levels, accuracy of forecasting and warning data, flood management plans) are more subjective, but they can certainly be turned into evaluation indicators with a bit of planning and imagination. Note that the *Design Summary* includes a mix of structural measures and non-structural activities (warning, forecasting, flood insurance) as well as direct effects (reduced incidence of urban poverty) linked with indirect effects (improvement of life for the poor). The Design Summary also specifies compliance with national regulations and conformance with ADB policies and it alludes to support for basin-wide IFM efforts. All of this information provides fertile ground for developing evaluation indicators.However, developing evaluation indicators is not without pitfalls and the Organization for Economic Co-operation and Development (OECD) recommends some precautions:

(...) caution in using indicators, as their application may have unintended negative side effects. Using "percentage of population living in a flood plain" as an indicator of effective adaptation, for example (where a low percentage would be considered a step towards successful adaptation), could lead governments to adopt policies of resettlement and relocation, which, in some cases, may not actually benefit the households concerned. After the floods in Mozambique in 2000, many households were relocated away from the flood plains in which they lived. However, OECD found that many of the people concerned were not provided with new homes, sufficient farmland or adequate alternatives to their original livelihood strategies and have returned to the flood plains
(UNFCCC, 2010).

Table 1 — Asian Development Bank`s Hunan Flood Management Sector: Project Performance Targets and Indicators (ADB, 2006)

Design summary	Performance Targets/Indicators
Impact: Sustainable and inclusive socioeconomic growth in flood-prone areas of Hunan Province.	– Number of newly established industrial and commercial enterprises in the project areas increases compared with base year 2006. – Land values for commercial and industrial purposes in project areas increases by at least 20% over 2005 levels by 2012. – Urban poverty incidence in the project areas is reduced compared with 2003 incidence of 6.7%.
Outcome: Flood protection for strategic and priority flood-prone areas in the upper reaches of the four main river basins in Hunan Province is improved.	– Annualized flood damage and disaster relief costs are reduced in participating cities as a result of increased standards for flood protection works and improved flood emergency preparedness. – Direct economic losses from floods and waterlogging are reduced compared with current average losses.
Output 1: Nonstructural flood management systems: operational flood warning and management systems for up to 35 municipalities and counties linked to the provincial flood-warning and -management system.	– Warning time against potential floods in the project area is increased (current warning time is a few hours to one day). – Forecasting and warning data are more frequently accurate.
Output 2: Structural flood protection, resettlement and environment management: flood protection works are completed in priority locations as part of Hunan's River Basin Flood Control Plan and the 11th Hunan Provincial Five-Year Plan and in compliance with People's Republic of China regulations and ADB safeguard policies.	– Flood-control level of county-level cities is improved to 1 in 20-year-return flood from below 1 in 5-year-return flood recurrence by the end of project. – Flood-control level of municipal cities is improved to 1 in 50 or 100-year-return flood by the end of the project. – Satisfaction level of the 20,133 relocated persons is restored to pre-resettlement levels in terms of income and livelihood. – Percentage of environment management plan monitoring targets is achieved.

Design summary	Performance Targets/Indicators
Output 3: Project management and capacity building: operational and strengthened project management and monitoring systems.	– Timely and informative reporting of local project management offices reflects accurate and on-time project implementation in line with agreed assurances. – Domestic systems-based project management and monitoring system, including Project Performance Management System, is operationalized.
Output 4: Flood management sector planning: selected sector assessments and planning to support development of IFM plans (grant financed through the advisory technical assistance).	– Basin-wide flood-warning system development needs are assessed; flood insurance is appraised with support from advisory technical assistance; next actions for inclusion in a future flood management plan are agreed upon by key provincial authorities by 2008.

58 The Mozambique experience is an excellent example of how a project could be successful in strictly flood management terms, yet mal-adaptive in the larger adaptation context. Evaluators must be certain to view both indicators and outcomes on a community-wide or basin-wide basis so as to capture and assess the true value of flood management project and program activities.

4.4 Value and limitations of CBA and MCA

59 *Cost-Benefit Analysis* (CBA) is an analytical model used to make investment decisions on a project. It is used to analyze feasibility of projects and identify the best alternative activity, process or outcome that minimizes resources (expenses) to achieve desired outcomes. The strength of CBA resides in (WMO, 2007):

- Identifying items of benefit and cost in the flood management project from an economic viewpoint, i.e. taking into account all the benefits accruing to and all the costs incurred by the economy or society as a whole;
- Selecting appropriate prices for evaluating the benefits and costs in monetary terms; and
- Adjusting the future prices of costs and benefits to present values to make them comparable.

60 In the flood management context, CBA is preferably used for the assessment of individual, well-specified flood management measures or actions where data on the expected impact is well documented.

61 *Multi-Criteria Analysis* (MCA) is a structured approach for determining overall preferences among different policy measures where several objectives for each policy may be involved. It identifies possible policy alternatives (along with associated actions) and assesses each alternative under multiple criteria. MCA is often used in conjunction with CBA and it represents a more flexible approach, especially in cases where options are difficult to express in purely monetary terms. MCA is subjective and depends on individuals. It is more easily integrated in participatory planning processes regarding identification of options of data gathering and criteria weighting. Being simpler than CBA, it can be used as its precursor, reducing the number of projects/

activities under scrutiny. After downsizing, rigorous analysis using CBA can be done for the selected projects/activities.

62 Both CBA and MCA are generally *ex ante* processes, but they may be incorporated into an *ex post* evaluation as a means of assessing whether the policies, objectives and actions decided upon truly add value to the program or project. If the original analysis was flawed or if important data were not included, then the results may not be what was originally intended. MCA is generally more transparent, in terms of process, but the level of complexity may make it difficult for the untrained (or the general public) to understand.

63 Practical application of these models can present challenges. Flood management projects are usually initiated after a serious flood and often only damage data from such floods are available. The number of years taken into account for determining the average varies from five to ten recent years along with the flood of the exceptional year. The inclusion of the damage data of a severe flood year in a series containing the preceding five or ten years' data may lead to a marked over-estimation of the average damage figures. If the flood damage data from past flood events are either not available or are not reliable enough, the direct benefits from the flood protection projects are estimated based on synthetic damage frequency relationships developed using physical surveys. MCA is not really strong in making long-term comparisons. Impacts during the project construction phase are not distinguished from impacts during the operational phase. MCA also has no analytical technique like discounting to compare impacts (benefits and costs) occurring in different years (WMO, 2007).

64 Both CBA and MCA emphasize maximizing efficiency, but they are less effective at addressing issues of equity and socio-economic disparity. CBA generally ignores the question of who is affected or how and it measures efficiency regardless of who gets the benefits and who incurs the costs. Yet, these issues are at the heart of climate change effects and adaptation planning.

> *Different societal mechanisms for spreading the financial burden can be discussed in terms of efficiency and fairness. A complicating feature of this type of comparison is that while normally there is consensus on what efficiency means, there is seldom consensus on interpretations of equity or fairness. Who should pay for the risks being taken by a few living in the flood prone areas is always debatable and would depend on the societal context*
> (WMO, 2007).

65 There really is no *"good"* or *"bad"* practice in using various types or models of economic valuation, cost-benefit analysis, assessment of direct or indirect effects or tangible and intangible costs. They all can and should be used in ways that are appropriate to their strengths and mindful of their drawbacks. Evaluators must be aware of both the advantages and disadvantages of these approaches and their applicability in developing indicators and methods for evaluation.

5 EVALUATION PROCESSES AND TOOLS

66 Evaluators and auditors are, to some extent, bound by the stated objectives and posited outcomes of the program or project under scrutiny. It is not useful to criticize a project for failing to meet an outcome that was not proposed in the project plan. Evaluators can certainly make judgments about whether a project objective is useful to the project or beneficial to the community or if the posited outcome is not amenable to assessment or analysis. It is preferable that evaluators, especially internal evaluators, take part in program planning from the very beginning. Ideally, every program or project plan should include a plan or process for evaluating processes, outcomes and corrective actions.

67 External, third-party evaluators or auditors may also be guided by higher-level criteria in carrying out the assessment: government regulations, agency directives, corporate policy, contractual requirements and/or granted covenants and even NGO policies and standards. External evaluators will certainly examine objectives and outcomes internal to the program while, at the same time, relating those objectives and outcomes to the larger context of national policy or community benefit. This larger context becomes important when considering the contribution (or lack thereof) that the project makes to the overall progress of climate change adaptation. Regardless of the details, flood management programs and projects have the same basic goals:

- Enhancing quality of life by reducing flood damages;
- Being prepared for floods when further flood prevention is not possible;
- Mitigating flood impacts on human and ecological systems, both short-term and long-term;
- Using resources efficiently in providing, maintaining and operating infrastructure and prevention/preparedness measures;
- Preserving and maintaining economic activity (agricultural, industrial, commercial, residential) where possible on the flood plain.

68 These goals both support IFM and enhance the community's adaptive capacity. The requirements of adaptation planning and implementation also create new challenges for developing an evaluation program and for identifying evaluation indicators. Additional challenges are related to (World Bank, 2010b):

- Uncertainty surrounding climate change impacts—including the frequency and intensity of extreme events—and the long-term repercussions of climate change effects can make assessing the impacts of adaptation difficult.
- Indirect effects of climate change impacts, including health issues, social turmoil and conflicts, migration, etc. ... can considerably affect the project's impact and, hence, need to be taken into account when undertaking an evaluation.
- For projects designed to reduce vulnerability to infrequent extreme events, the project or activity can be evaluated only if the foreseen event occurs before evaluation of the project. If such an event does not occur, it may be difficult to determine if the project or activity was properly implemented. The same is true for projects addressing long-term risks from climate change, when impact evaluation can be even more difficult as long-term climatic changes may not be evident when the time comes to evaluate the project.

5.1 Data and indicators

69 Collection and analysis of data form the core of any evaluation or audit. Data may be quantitative or qualitative, objective or subjective; it may come from document reviews, observation, interviews of project staff, surveys or questionnaires. Raw data is not very useful unless it can be tied to a baseline (for comparison, say, before and after the fact), linked to a timeline (for exploring issues of cause and effect) or assured of comparability (comparing apples to apples and oranges to oranges) over the life of the project (UNDP, 2009).

70 Primary data comprise information that evaluators observe or collect directly from participants about their first-hand experience with the project. These data generally consist of the reported or observed actions, policies, outcomes, opinions and knowledge of direct participants, usually obtained through questionnaires, surveys, interviews, focus groups, key informants, expert panels, direct observation and case studies. These methods allow for in-depth exploration and yield information that can facilitate deeper understanding of observed changes in outcomes and outputs (both intended and unintended) and the factors that contributed to them.

71 Secondary data are collected, compiled and published by someone else. Secondary data can take many forms but usually consist of documentary evidence that has direct relevance for the purposes of the evaluation. Sources of documentary evidence include: demographic data; published reports; social, health and economic indicators; project or program plans; monitoring reports; previous project/program reviews, evaluations and other records that may have relevance for the evaluation. Documentary evidence is particularly useful when the project or program lacks baseline indicators and targets for assessing progress toward outputs and outcome measures. Although not a preferred method, secondary data can be used to help recreate baseline data and targets. It complements and supplements data collected by primary methods but does not replace collecting data from primary sources.

72 **Table 2** identifies a number of data collection methods, along with their advantages and disadvantages. The list is not exhaustive. Evaluators and auditors may choose to use a

combination of methods at different times over the life of an evaluation. In choosing data collection and analysis methods, they must balance: availability of data against cost of obtaining the data; ease of use against applicability to the relevant objectives, outcomes and indicators; quantity of data obtained against representativeness of the information; and quality of the data against the continuity and completeness of the data over time.

Table 2 — Some Common Data Collection Methods
Modified from (UNDP, 2009)

Method	Description	Advantages	Challenges
Monitoring and Evaluation Systems	Uses performance indicators to measure progress, particularly actual results against expected results.	Can be a reliable, cost-efficient, objective method to assess progress of outputs and outcomes.	Dependent upon viable monitoring and evaluation systems with established baseline indicators and targets. Requires reliable data on targets over time as well as data relating to outcome indicators.
Extant Reports and Documents	Existing documentation, including quantitative and descriptive information about the project, its outputs and outcomes, capacity development activities and other evidence.	Cost-efficient	Documentary evidence can be difficult to code and analyze in response to questions. Difficult to verify reliability and validity of data.
Questionnaires	Provides a standardized approach to obtaining information from a large number of participants (usually employing sampling techniques) regarding project activities, outcomes, gaps, etc.	Good for gathering descriptive data on a wide range of topics quickly at relatively low cost. Easy to analyze. Gives anonymity to respondents.	Self-reporting may lead to biased reporting. Data may provide a general picture but may lack depth. May not provide adequate information on context. Subject to sampling bias.
Interviews	Solicit person-to-person responses to specific questions; obtain in-depth information about a person's impressions or experiences; learn more about their answers to questionnaires or surveys.	Facilitates fuller coverage, range and depth of information of a topic.	Can be time consuming. difficult to analyze, costly. Potential for interviewer to bias client's responses
Direct Observation	Requires a detailed observation form to record accurate information about ongoing activities, processes, discussions and observable results as directly observed by the evaluator.	Can see operations of a project as they are occurring. Can adapt to events as they occur.	Can be difficult to categorize or interpret observed behaviors. Can be expensive. Subject to (site) selection bias

73 An interesting example of data collection and use in evaluation is an assessment report prepared by ADB regarding the South Java Flood Control Sector Project. The evaluators examined baseline economic surveys, government (district, provincial, national) statistics, project monitoring and audit reports and communications between project staff and ADB. In addition, they evaluated project compliance with some 33 project loan covenants (ADB, 2007).

74 Another example is a performance audit conducted by the National Audit Office of the United Republic of Tanzania regarding the management of prevention and mitigation of floods in one area of the country from 1990 to 2005. The auditors built the audit around the following seven questions that were directed at government officials and flood managers at all levels (NAO, 2007a):

- Are adequate preventive structures in place?
- Is there an appropriate drainage system regarding flood water?
- Are residences located in threatened areas? If so, what measures have been taken to reduce damages or put preventive structures in place?
- Is the Regional Secretariat mobilizing specific funds for floods prevention?
- Does the Regional Secretariat have an anti-flood program?
- Has the Prime Minister's Office—Disaster Management Department (PMO—DMD) got an adequate monitoring system for flood prevention at Babati and elsewhere in the country?
- Has the PMO—DMD promoted/arranged seminars/workshops/courses or other events that directly aim at improving flood management (disaster management) in Babati?

75 These questions were generated from the objectives of the National Audit Office and they served as a structure for all of the information-gathering and data analysis activities of the audit. It is important for evaluators to understand that performance indicators fill a vital role in an evaluation or audit, but they do have limitations. Indicators only indicate; they do not explain. Indicators cannot really address all of the questions the evaluation seeks to address. They can describe and help to measure the progress made, but they likely cannot explain why that progress was made or what factors contributed to the progress.

5.2 Evaluation and analysis tools

76 There are two different, but complementary, approaches to conducting program evaluations—one focusing on the conduct of the project itself and one focusing on the outcomes of the project. The primary purpose of a project evaluation is to make improvements, to continue or expand an initiative, to assess replicability in other settings or to consider alternatives. An outcome evaluation assesses the extent of progress towards achieving the outcome, the possible unintended effects of activities related to this outcome, what factors contribute to the success (or otherwise) of the outcome and the effectiveness of the project/process in achieving the outcome. **Table 3** provides a comparison of the two approaches.

Table 3 — Comparison of project and outcome evaluations
Modified from (UNDP, 2009)

	Project Evaluation	Outcome Evaluation
Focus	Inputs, activities and outputs; if and how project outputs were delivered within a sector or geographic area and if direct results occurred and can be attributed to the project.	Whether, why and how the outcome has been achieved and the contribution of the outcome to a change in a given management situation.
Scope	Specific to project objectives, inputs, outputs and activities Also considers relevance and continued linkage with outcomes.	Broad, encompassing outcomes and the extent to which programmes, project, soft assistance, partners' initiatives and synergies among partners contributed to its achievement.
Purpose	Project based to improve implementation, to re-direct future projects in the same area or to allow for upscaling of project.	To enhance development effectiveness, to assist decision making, to assist policy making, to re-direct future project activities, to encourage improvements

77 As an illustration of the difference, development of adaptation policies (e.g. preparation of catchment-specific flood management policies and plans) would be a project-based indicator, while effectiveness of adaptation (e.g. reduction in economic losses due to floods) would be an outcome indicator. Two illustrative examples of these approaches are LogFrame Approach and Impact Evaluation.

78 *Logical Framework* (Logframe) *Approach* (LFA) is a management tool used to improve the design of activities, most often at the project level.

79 It involves identifying strategic elements (inputs, outputs, outcomes, impact) and their causal relationships, indicators and the assumptions or risks that may influence success and failure. It thus facilitates planning, execution and evaluation of a development intervention (OECD, 2010).

80 LFA is the most widely used management tool in the design, monitoring and evaluation of international development projects. It affords a useful analytical and organizational tool for identifying important project components. It applies a number of tools such as institutional capacity assessments, economic and financial analysis and environmental assessments. The findings from a LFA are usually brought together in a matrix, called a logframe. While the rows list the vertical hierarchy of objectives—activities deliver outputs, which contribute to outcomes that help bring about the overall goal—the columns present how each objective will be assessed and means of assessment. The columns also outline assumptions that may affect project achievements.

81 **Table 4** shows the usual organization of project information into a Logframe. Note that the second and third columns would be of particular value to an evaluator or auditor. In practice, the typical Logframe structure may be further subdivided (both rows and columns) to reflect specific tasks and sub-tasks or to include detailed reference to indicators, sources of data and documentation. Variations on the Logframe theme abound and although the Logframe approach is used most widely in the development program field, it is increasingly popular in

managing adaptation programs. Evaluators of flood management programs can easily make use of this tool, especially as a means of integrating flood management (notably IFM) into larger adaptation efforts. (Examples of a more fully-developed Logframe are available in (Spearman and McGray, Lamhauge et al., 2011).)

Table 4 — An example of a typical Logframe (Lamhauge et al., 2011)

Narrative summary	Objectively verifiable indicators	Means of verification	Assumptions
Goal—the overall aim to which the project is expected to contribute	Measures (direct or indirect) to show the project's contribution to the goal	Sources of information and methods used to show fulfillment of goal	Important events, conditions or decisions beyond the project's control necessary for maintaining the progress towards the goal
Outcomes (or objectives)—the new situation which the project is aiming to bring about	Measures (direct or indirect) to show progress towards the objectives	Sources of information and methods used to show progress against objectives	Important events, conditions or decisions beyond the project's control necessary if achieving the objective will contribute towards the overall goal
Outputs—the results that should be within the control of the project management	Measures (direct or indirect) to show if project outputs are being delivered	Sources of information and methods used to show delivery of outputs	Important events, conditions or decisions beyond the project's control necessary if producing the outputs will help achieve the objectives
Activities—the things that have to be done by the project to produce the outputs	Measures (direct or indirect) to show if project outputs are being delivered	Sources of information and methods used to show that activities have been completed	Important events, conditions or decisions beyond the project's control necessary if completing activities will produce the required outputs
Inputs	Resources—type and level of non-financial resources needed for the project Finance—overall budget Time—planned start and end date		

82 *Impact Evaluation* **(IE)** is an evaluation of the effects—positive or negative, intended or not—on individuals, households, institutions and the environment caused by a given program or project action. Such an evaluation can be conducted in mid-project or at the end of the project to assess both impacts as well as outcomes. Whereas project evaluations focus on institutional process, IE assesses the impact of programs on the community's well-being.

83 An IE addresses the question of how participants' welfare would have been altered if the intervention had not taken place (Prowse and Snilstveit, 2009). This type of analysis requires a comparison between what actually happened and what would have happened in the absence of the program or project intervention. This "counterfactual" analysis estimates the impact of the difference in outcomes between a 'treatment group' (those receiving the intervention) and a 'control group' (those who don't).

84 The difference-in-difference (or double difference) estimator uses baseline and end-line data to calculate the change in outcomes over time across the two groups. There are various approaches to determining an appropriate control group for counterfactual, including randomized selection of participants in the analysis, pre-selection of participants and matching control group participants with treatment group participants for longer-term observation.

85 There are, of course, a number of issues confronting the application of IE to the evaluation of flood management programs. These include sampling problems and the accuracy of statistical data. Even more salient is the problem that the entire population of a flood area may have been affected (i.e., the treatment group) leaving no one to form the control group, and vice versa.

86 Another important issue connected to impact evaluation is attribution—that is, determining to what extent an action or intervention or other project element, rather than other external factors, have contributed to outcomes or impacts. Use of counterfactual analysis, no matter how central to IE, hinges on the absence of a negative event—a flood—and may create an anomalous finding if the event circumstances are significantly different from what was forecasted.

87 With these caveats in mind, however, evaluators and auditors can certainly align their assessment activities with an IE paradigm being used to assess a larger adaptation effort.

5.3 Measuring success

88 The basic role of an evaluation is to measure the success of a program, project or activity in meeting its objectives and producing good outcomes.

89 In addition to achieving numerical metrics and targets or demonstrating compliance with regulatory requirements or grant covenants, a flood management program should also be evaluated against a more-encompassing set of criteria—those relating to the program's contribution to climate change adaptation.

90 Valencia (2009) has identified a number of cross-cutting criteria against which the evaluation of adaptation initiatives must be considered. The list includes:

- Evaluation against climate scenarios—for flood management, these would include changes in precipitation patterns and the incidence of extreme weather events.
- Performance of project interventions against climate events—performance of building codes and flood plain management initiatives
- Comparison of performance between areas—e.g., between separate sections of the flood basin or watershed; comparison between similar disasters in different time periods
- Assessment of outcomes against known best practices, global target or recommended standards—incorporation of flood risk into infrastructure design and operation; climate-proofing of structures

91 He has also identified some attendant difficulties:

- Success when nothing happens—how do you evaluate the impact of an intervention against something that does not happen?

- Evaluations occur too early—Should one evaluate at the end or the middle, at specific benchmarks along the way?
- Uncertainty of climate scenarios—what scenarios do evaluators examine for an intervention's success?
- Short-term weather variability—Is an intervention or an action "successful" against an impact that is greater or less than projected?
- Contribution rather than attribution. How do you gain a clear understanding of the cause-effect chain?

92 Both the criteria and the difficulties identified above could affect the formulation and implementation of an evaluation program for flood management and they must be carefully considered as part of the evaluation/audit planning process.

93 Adaptation success will be observed over many decades and will require continuing evaluation over timeframes considerably longer than most program or project life expectancies (Hedger et al., 2009).

94 There are five criteria proposed for evaluating the long-term success of adaptation initiatives:

- **Effectiveness:** Achieving objectives. Effectiveness refers not only to achieving identified, measurable objectives, it also relates to the adaptive process, capacity building, information exchange and growth and learning from experience.
- **Flexibility:** How far can one adapt? The uncertainty inherent in climate change may result in doing too little or too much. Relying on worst-case scenarios may lead to over-commitment of resources and capital. Successful adaptation has to be flexible, seeking "win-win" and "low/no-regrets" solutions to meet the potential range of climate change scenarios.
- **Equity:** Rather than choosing winners and losers, adaptation programs have to confront and solve the problems of inequalities across countries, sectors, societies and populations. Adaptation that does not address these inequalities will undermine the possibility of economic gains and improvements.
- **Efficiency:** Cost-effectiveness is a useful tool for comparing two alternatives, but it will not tell you whether an alternative is justified in the first place. Successful adaptation will require decisions on acceptable risks and the level of resources that can or should be expended to manage those risks. Risk spreading through insurance, regulatory drivers and government policies can help to clarify and support risk decisions, while market mechanisms can support innovation in both processes and production that are supportive of adaptation strategies.
- **Sustainability:** Sustainability looks beyond the immediate impact of a program, project or intervention to achieve longer-term viability of adaptation strategies. That is, will a measure (adaptation, flood management, etc.) support success beyond a one-time implementation? Will strategies be robust in the face of changing circumstances and will they continue to offer ancillary benefits and synergies that support continued improvement and economic development?

6 IMPLEMENTATIONS STRATEGIES AND TACTICS

95 The terms evaluation and audit are used interchangeably in this section. One could carry out a formal, focused audit of a specific function as part of a larger program evaluation or an audit could comprise the entirety of an evaluation. Regardless of the name, the process and requirements are essentially the same. It is necessary to create an evaluation/auditing program plan to guide the implementation of the program as a whole and to develop a plan for any specific, focused evaluation or audit events.

6.1 Building an evaluation/auditing program

96 A report prepared by the (NAO 2007a) evaluated the Environment Agency on the management of flood risk in England and suggested improvements to it. However, one cannot imagine that any program director would want to have the following said about the program:

> *The Agency does not routinely conduct post project appraisals of major construction projects to identify good practice or determine whether new flood defences will work as intended ... In addition to the lack of a clear process for sharing lessons learned, the Agency appears to have limited data on how well its flood defences are likely to perform. Only 15 out of 26 post project appraisals had a section on post completion and benefits delivery. This is in part due to the fact that flood defences are only rarely tested against the standard of protection they were designed to provide.*
> (NAO, 2007b).

97 The importance of having an evaluation mechanism, fully integrated with program management and project delivery, cannot be overstated. When aligned with organizational performance metrics, a robust monitoring and evaluation program can enhance accountability and promote realism in project design through the incorporation of lessons learned. It is a vital element in

the continual improvement of program effectiveness over time. A thorough and comprehensive evaluation program must be developed prior to conducting evaluations or audits. Without a program plan, evaluations may be vulnerable to criticism for bias, inconsistency, lack of standards or irrelevance.

98 An evaluation program plan begins with answering several framing questions (UNDP, 2009):

- What program activities, projects or outcomes need to be evaluated or audited?
- Who is responsible for evaluation activities?
- When will evaluation activities be conducted (timing)?
- How will evaluations be carried out (methods)?
- What resources are required and how will they be committed and managed?

99 The plan should then state clearly why evaluations are being conducted, what kinds of information will be collected, who will use the information and how the information will be used. Prime criterion for the success of any evaluation program is management support for evidence-based and results-based management buttressed by evidence-based and outcomes-based evaluation of program activities. Without a high level and visible commitment of top management interest and support, the evaluation program will progress rather slowly. An evaluation program must have a dedicated staff team, large enough and sufficiently trained in evaluation techniques to support an on-going evaluation activity. The evaluation program must be organizationally independent from operating units and evaluators must be guaranteed the necessary independence and management support to carry out their function.

100 The Global Environment Facility Evaluation Office has established the requirements for a Monitoring and Evaluation **(M&E)** program thusly (GEF, 2010):

Each full-size project and all programs will be evaluated at the end of implementation. This evaluation will have the following minimum requirements:

- The evaluation will be undertaken independent of project management or if undertaken by project management, will be reviewed by the evaluation unit of the GEF Agency or by independent quality assurance mechanisms of the Agency.
- The evaluation will apply the norms and standards of the Agency concerned.
- The evaluation will assess at a minimum:
  - achievement of outputs and outcomes and provide ratings for targeted objectives and outcomes;
  - likelihood of sustainability of outcomes at project or program termination and provide a rating for this; and
  - whether Minimum Requirements 1 and 2 were met and provide a rating for this.
- The report of this evaluation will contain at a minimum:
  - basic data on the evaluation:
    - when the evaluation took place?
    - who was involved,

  - the key questions and
  - the methodology—including application of the five evaluation criteria;
- basic data of the project or program, including actual GEF and other expenditures;
- lessons of broader applicability; and
- the terms of reference of the evaluation (in an appendix).

– The report of the evaluation will be sent to the GEF Evaluation Office immediately when ready and at the latest, within 12 months of completion of project or program implementation.

101 ADB in evaluating the South Java Flood Control Sector Project, formed and supported project monitoring and evaluation units and provided them with considerable training – both theoretical and on-the-job—in project monitoring and evaluation, evaluation and reporting, policy indicators, data analysis, Geographic Information Systems as well as training on various technical aspects of the program (ADB, 2007).

102 The Bihar Kosi Flood Recovery Project (World Bank, 2010a) included an Environment and Social Management Framework **(ESMF)** designed to help communities recover from the impacts of the flood and reduce vulnerability from natural disasters by, in part, incorporating environmental and social aspects into the decision-making process at all stages of project planning, design, execution and operation. An explicit part of the program plan was a requirement for an external compliance audit (World Bank, 2010a):

Third party auditors will be appointed by the Project Management Unit **(PMU)** to provide independent assurance on compliance of ESMF, including Environment Management Plans and Resettlement Action Plans across project sites. The third party auditors shall:

– Prepare the environment and social audit plan.

– Conduct random field visits in case of environmentally or socially sensitive areas.

– Review the performance of the project through an assessment of periodical monitoring reports submitted by the line department/Project Implementation Units (PIU).

– Prepare report/s for sub-component/sub-project activities after reviewing compliance of ESMF and other statutory/regulatory requirements, as applicable through scheduled or unscheduled audits. Also, provide specific recommendations, as and if required to improve compliance on environment and social management aspects during planning, design and implementation of sub-project activities/works.

– Share audit findings with the PMU to aid timely decision making and adopting appropriate mitigation action, as and if necessary.

103 Note that this project addressed not just the technical aspects of flood control but also the human health, social and environmental aspects as well as restoration of livelihoods and living standards. The evaluation program specified in the Framework supports this effort to enhance adaptation and adaptive capacity of the community.

104 Finally, there are other factors that should be considered and adopted as part of an evaluation program. A mix of quantitative, qualitative and narrative tools may be used, including surveys, interviews, focus groups and scorecards, so that results can be compared to give the most accurate picture possible of progress towards desired outcomes. Just as researchers, technicians, hydrologists, engineers, geologists, sociologists and officials are equally involved

in flood management—and success requires a strong collaboration and interaction among them—similarly, flood management activities evaluation also requires interdisciplinary approach involving experts of these different fields (among others) in order to evaluate the many and varied aspects of flood management, flood risk assessment and lessons learned.

105 **Appendix A**, drawn for a number of the standards discussed in **Section 3.4**, provides a set of professional and program standards that form the basis for an evaluation program plan. **Appendix B** is an example outline of an evaluation program plan that can be tailored to meet the needs of an evaluating organization.

6.2 Conducting a specific evaluation or audit

106 It is necessary to create a plan for a specific evaluation or audit directed at a discrete program element, project or set of activities for the same reasons that an evaluation program plan is created—to ensure credibility, consistency, avoidance of bias and quality control. An evaluation/audit plan contains many of the same types of information that one would find in a program plan, only more focused and in more detail. For example:

- Audit objectives—why are we doing this?
- Audit scope and methodology—how are we going to do this?
- Audit schedule—phases, timelines, key milestones, report deadline, etc.
- Audit team—who will conduct the audit?
- Training requirements—do the auditors require any specialized training to conduct the audit?
- Resource requirements and logistical needs; consultant support (if necessary)
- Roles and responsibilities
- Data management and documentation requirements

107 An audit plan need only be as lengthy and complex as the character and circumstances of the activity being audited require. If there are significant sub-projects or discrete elements of a project to be audited, it may be necessary to create separate, subordinate audit plans to ensure clarity and consistency over the duration of the audit. The literature is replete with discussions of assessments, evaluations and audits carried out for flood risk, flood prevention, flood response and associated activities, but few documents or reports explain their evaluation plan and methodology in any detail.

108 The Auditor General for the state of Victoria in Australia published an audit report on stormwater flooding risks in Melbourne. The report discusses how the audit was conducted and one can infer the planning for and structure of the audit. For example (Auditor General, 2005):

- The objective of this audit was to determine whether the stormwater management practices adopted (…) had efficiently and effectively addressed stormwater flooding risks (…). The audit asked two key questions:
  - Had the stormwater flood mitigation strategies adopted by these agencies diminished the exposure to damage caused by flooding?

  - Were the drainage infrastructure asset management practices adopted by these agencies optimising the useful life and service capability of their assets? ([…])

– To conduct the audit we:
  - surveyed each agency on its asset management and flood mitigation practices
  - interviewed key staff and reviewed relevant documentation
  - inspected a sample of drainage assets.

109 **Appendix C** is an exemplar outline of a project- or activity-specific audit plan that can be tailored to meet the needs of an evaluating organization.

6.3 Signposts and roadblocks

110 As one advances through the process of planning an evaluation program and/or an audit activity, there are a number of issues and questions that should be examined periodically to determine if the evaluation/audit is on track, if it is still appropriate to the program being evaluated and can still add value to the function as a whole:

– Are there policies, programs, procedures, processes in place to guide and direct flood management planning and implementation activities?
– Have project(s) goals and objectives been clearly defined and expressed?
– Risk assessment—How do you decide what to audit first? What are the activities or program components that pose the greater risk (e.g., financial, reputational, safety, public health, regulatory, mitigation, etc.) to the success of the flood management effort?
– Are there internal controls (and an internal assessment process) in place to ensure that program/project activities are adequately managed? Are they appropriate? Are they working effectively?
– Are the programs meeting/achieving the goals for which they were established?
– Is there a formal process for identifying lessons learned and adaptive changes that may be necessary as the project moves forward?
– When do you conduct an audit—At the end? (and when is the "end"?) In the middle? At specific benchmarks or waypoints?
– Should the evaluation focus on auditing specific activities? Or outcomes? Or internal controls? Or all of the above?
– What about corrective actions identified in the audit report? Who keeps track? Who is responsible for ensuring that they are carried out?
– How do you know that your answers to these questions are correct?

111 Finally, it is important to consider safety and security issues. Is it safe for evaluators or auditors to operate in the project/program area? This becomes particularly salient in disaster areas or those affected by social instability or armed conflict. Crisis situations are, by definition, "not normal," and this can affect all aspects of monitoring and evaluation. The evaluation methods,

planning factors and mechanisms discussed in this document are transferable to crisis settings, though with some important caveats (modified from UNDP, 2009):

- Crisis situations are dynamic and planners should quickly respond to radical changes that often take place in such circumstances. The situation should continually be analyzed and monitored to ensure that the evaluation program remains relevant. Any changes made to an evaluation or audit should be documented so that the results will remain credible and useable within the context of the fluid or disruptive circumstances under which the evaluation was conducted.
- Crisis situations are characteristically ones of raised (or potentially raised) tension between different parties. Crisis and conflict sensitivity should inform all aspects of evaluation planning to ensure that both the content and process of evaluation is conducted in a way to reduce or at the least not heighten tensions between different parties. Security of evaluation program staff must be a constant concern and risk analysis for all those involved should be a consistent part of evaluation planning.

6.4 Flood management and climate change adaptation

112 To return to a theme discussed earlier in this document, it is becoming clearer that recognizing uncertainty is important for appropriately integrating adaptive capacity and resilience into flood risk management programs. Given that the future is uncertain and that past experience may no longer provide a reliable guide for future actions, flood management will become an iterative process of defining objectives, assessing risks, appraising options, implementing and evaluating results. Flood management programs must expand their purview beyond technical, structural solutions and encompass the larger issues of resilience, sustainability and adaptive capacity.

> *Urban water supply and sanitation, housing settlements, pollution control, transport systems, industrial activities, health and social welfare are many of the development activities undertaken by municipal governments and private-sector institutions. It is quite likely that these activities will be impacted by flood hazards and by the flood management actions taken to cope with those hazards. It is also possible that development activities will have some impact on flood management policies, plans and actions. In addition, certain other regional development activities beyond the municipal limits such as agricultural production, watershed management, energy production and environmental protection, among others, also effect flood management in urban areas. For these reasons, it is vital that urban flood management activities be mainstreamed in all these related activities*
> (WMO, 2012).

113 Evaluation of flood management programs can contribute significantly to the climate change adaptation process. According to (UNFCCC 2010), EU countries are building the comprehensive legal, institutional and technical environment for evaluating adaptation plans and practices at national and local level.

> *The EU suggests that such integrated approaches allow rapid accumulation of knowledge, avoid duplication of work and are more cost-effective than running isolated projects. It argues that integrative monitoring and evaluation provides the flexibility and robustness that adaptation planning*

> *requires to adjust to uncertainties and new insights and to take account of changing stakeholder attitudes to risk*
> (UNFCCC, 2010).

114 While borrowing techniques from the field of adaptation evaluation, the practice of evaluating flood management activities can bring a sense of rigor to the adaptation field, in that flood management projects are often based on metrics and measureable outcomes.

> *Given the range of possible adaptation indicators, the European Environment Agency sees a need for an agreement, for example on a regional scale, on the definition of key climate change indicators, including extreme weather events (e.g., floods and droughts), and to define operational ways of tracking impacts in multiple sectors, over a variety of timescales and geographical scales*
> (UNFCCC, 2010).

115 Considerable effort has been made toward the monitoring and evaluation of adaptation projects through the use of indicators, but progress is less noticeable for adaptation policies and programs. This may relate to the fact that many adaptation policies and programs lack measurable targets or clearly defined outcomes.

7 CONCLUSION

116 Integrated flood management is not a singular event or process. It is a vital part of integrated water resources management on a basin-wide scale. Both of these processes take place within the context of climate change and they must be responsive to the likely—though still uncertain—effects of climate change. At the same time, population growth and related social dynamics, livelihood requirements, economic development, land use development, environmental degradation and increasing urbanization interact to influence the hydrological circumstances of a river basin and floodplain. Each of these forces is dynamic and continues to evolve, as do the direct and indirect pressures they exert on flood management practices.

117 The imperatives of good governance and the expectations of government officials, business leaders and the general public require that both flood management and adaptation programs be able to show good value and effectiveness for all of the time, money, energy and human capital expended to deal with climate problems. A comprehensive evaluation and audit program, reflecting the operational objectives of the organization and the social and climatic environment, can serve to keep programs and projects on track and identify the lessons that will improve performance over time.

118 To put it more formally:

> *Internal auditing is an independent, objective assurance and consulting activity designed to add value and improve an organization's operations. It helps an organization accomplish its objectives by bringing a systematic, disciplined approach to evaluate and improve the effectiveness of risk management, control, and governance processes.*
> (IIA, 2012b)

119 Packed within this definition are such issues as regulatory and/or contract compliance, identification and management of risks to the organization, public accountability and the ability to perform effectively the tasks with which the organization is charged. One also has to be able

to prove, through a credible and well-documented process, that effective results have been obtained and in the proper manner.

> *The credibility of the audit activity strengthens public governance by providing for accountability and protecting the core values of government, which it does by assessing whether managers and officials conduct the public's business transparently, fairly, honestly and in accordance with laws and regulations*
> (IIA, 2012b).

120 The value of a robust evaluation/audit program does not lie only in the problems it uncovers. If that were the case, an audit that uncovered no problems could be considered a failure. One might be tempted to assume that if audits only confirm a problem-free operation (really, what are the odds of that happening?), there is no need to continue conducting audits.

121 Rather, value comes from knowing that the organization has a clear, formal and structured method for testing and evaluating the performance of the organization. Such a program encourages and strengthens accountability because staff and management know that policies, procedures, activities and outcomes will receive scrutiny. It also helps to improve performance throughout the organization by regularly comparing what is supposed to be done with what actually gets done (and how) and then by mandating action to make things better.

122 Failure or hesitation to incorporate both flood management and climate change adaptation into a complementary evaluation paradigm could lead to future unnecessary costs, wasted investments and risks to life and property. Reluctance to insist on accountability and transparency could easily diminish the value of future efforts to manage the response to floods.

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APPENDIX A GENERAL STANDARDS AND EVALUATOR/AUDITOR ETHICS

These general standards apply to all evaluations/audits and address qualifications, independence, due professional care and quality control.

QUALIFICATIONS

Audit staff should collectively possess adequate professional proficiency for the tasks required. The qualification standard consists of the following components:

- ***Proficiency:*** The Audit Director will define the staff skills required for audits and the needed qualifications and will determine whether any special skills are required for an audit.
- ***Continuing Professional Education:*** Audit staff are expected to maintain and continuously improve their professional competence. Continuing Professional Education is essential for audit or evaluation staff and must be met to remain qualified to participate in audits. Program staff are responsible (in consultation with the Audit Director) for seeking opportunities for training and professional development, for successfully completing those activities and for ensuring that training is documented.
- ***Independence:*** In all matters relating to the audit work, the audit organization and the individual auditors should be free from personal and external impairments to independence, should be organizationally independent and should maintain an independent attitude and appearance. Objectivity is of fundamental importance to the Program's continued credibility. Impairments to objectivity can be personal, external or organizational.

Personal Impairments

Personal impairments to objectivity include factors that could cause, or be perceived as causing, a staff member to lose objectivity or perspective in planning work, developing evidence, evaluating performance or reporting findings, conclusions and recommendations.

Each staff member has the primary responsibility to avoid personal impairment. If a staff member believes there may be an impairment on a task or an audit, he or she must report the circumstances to the Director of Internal Audit.

Personal impairments may involve financial interests, personal opinions or biases or present or prior responsibilities.

- *Financial Interests:* To ensure that objectivity is maintained, staff must not have financial interests that conflict with their official duties. In addition to an employee's own financial interests, the financial interests of defined family members, partners or organizations, including those with whom the employee is seeking employment, can also prevent that employee from participating in an audit. Under certain circumstances, a personal impairment could exist if the results of an audit affect others who are not family members, e.g., a fiancé, an in-law or a roommate.
- *Personal Opinions or Biases:* Audit Program staff are expected to keep personal opinions or biases from influencing their work and to express their opinions in ways that are not likely to cause

others to believe that audit-related judgments would be influenced. If an auditor has very strong opinions regarding a controversial audit topic, the possibility of a personal impairment should be considered and resolved through consultation with the Audit Director.

- *Present or Prior Responsibilities:* If a staff member is assigned to review an entity for which he or she has worked in the past, the possibility of a personal impairment must be considered. All facts related to those other responsibilities should be considered and resolved through consultation with the Audit Director to determine that objectivity is not jeopardized.

External Impairments

Impairments may also exist when factors external to performing an audit affect a staff member's ability to reach independent and objective conclusions. Impairments could result from externally imposed factors such as scope limitations, transaction selection or timing requirements.

Since the goal of the Program is to provide useful and credible analyses and information to management, auditors must plan, perform and report the results of their work independently and objectively. Thus, the Audit Director must have discretion in determining how and by whom the audit or evaluation work is to be done, as well as in deciding what is to be included in the report.

Organizational Impairments

Independence can be impaired when the organizational location of an audit organization makes it susceptible to undue influence by those being audited.

Employee Ethics and Conduct

Audit Program staff must perform their duties in an ethical fashion and avoid the appearance of unethical conduct or practices. Employees must not be involved in circumstances that invite conflict between their self-interest and the integrity of Audit Program policies, such as seeking employment from a division being audited. When potential conflicts exist, staff must inform the Audit Director about such situations to ensure that action is taken to preserve the credibility of the office's work.

Outside Employment

Audit Program staff shall not engage in outside activities, with or without compensation, that are not compatible with the full and proper discharge of their City employment. Employees must notify the Audit Director before engaging in outside employment.

DUE PROFESSIONAL CARE

Due professional care should be used in conducting an audit and in preparing related reports.

Due professional care requires that staff members use sound judgment in determining those standards that apply to the audit, follow all applicable standards and withdraw from any audit when applicable standards cannot be followed. If it is not practical to withdraw from an audit or in any instance in which an applicable standard was not followed, the reasons for the departure and any known effects on the results of the audit or evaluation must be stated in the communication product. Due professional care also requires the following:

- Auditors shall ensure that the requester and the audited entity understand the audit objectives as well as the scope and criteria used in evaluating performance.
- Sound judgment must be used in establishing audit objectives and scope and in selecting and using appropriate methodology. Audit tests and procedures must be based on a sufficient understanding of the existing body of technical knowledge, with due consideration of the degree of acceptable risk.
- Findings, conclusions and recommendations must be based on an objective evaluation of competent, relevant and sufficient evidence.
- Standards regarding due professional care include follow-up on known significant findings and recommendations from previous audits that could have an effect on current audit objectives. Auditors should have a process for tracking the status of actions on significant or material findings and recommendations from prior audits.
- When the work of others is relied on in an audit, the acceptability of that work must be established or it must be attributed to others in the report.
- Staff must ensure that the performance of work and the basis for findings, conclusions and recommendations are accurately, promptly and fully documented in the audit work papers.

QUALITY CONTROLS

Each audit organization conducting audits in accordance with these standards should have an appropriate internal quality control system in place and undergo an external quality control review.

Audit management quality controls over audits include the following:

- Planning, using appropriate internal checklists, templates or other planning tools.
- Continuous supervision with expectations setting, review of work and staff evaluation, training and development.
- Evaluation of the progress and direction of audits at key stages.
- On selected projects, a staff member independent of the project should review audit products by assessing support for findings, conclusions and recommendations and bring unresolved items to the Audit Director for resolution.

DATA GATHERING AND ANALYSIS STANDARDS

These standards cover planning, supervision, compliance with laws and regulations, management controls and evidence. Guidance on each of these standards is included below.

Planning **– Work is to be adequately planned.**

Adequate planning means establishing precisely stated objectives and then selecting a work scope and methodology that will meet those objectives, considering time constraints, cost and other pertinent factors. It requires that, when work is performed with due professional care, audit objectives will be met with findings that are supported by relevant, competent and sufficient evidence. It also requires that audit objectives be met as efficiently and economically as possible.

A written audit or evaluation program should be prepared. It should specifically show the methodology to be used and the steps to be followed to ensure that each audit objective is met. The program should provide an effective basis for assigning work and supervising performance and should be modified, when necessary, as

work progresses. When modified during the audit, the audit or evaluation program should provide a summary record of the work performed.

Supervision **– Staff are to be properly supervised.**

The purpose of supervision is to ensure that audit objectives are being met and that all work meets the applicable standards. Elements of supervision include instructing staff members, keeping informed of significant problems encountered, reviewing the work performed and providing effective on-the-job training.

Compliance with laws and regulations **– When laws, regulations and other compliance requirements are significant to audit objectives, auditors should design the audit to provide reasonable assurance about compliance with them. In all performance audits, auditors should be alert to situations or transactions that could be indicative of illegal acts or abuse.**

If the audit objectives require tests of compliance with laws and regulations, auditors should perform the following steps:

- Identify laws and regulations that apply to the entity to be audited or evaluated and that are relevant to audit objectives.
- Assess the risk that noncompliance with these laws and regulations could significantly affect the program operations being audited or evaluated.
- Consider whether management controls deter or help detect noncompliance.
- Design work steps to reasonably assure (1) the entity's compliance with relevant laws and regulations and (2) detection of errors, irregularities, abuse or illegal acts that could significantly affect the audit objectives.
- Exercise appropriate caution in investigating illegal acts so as not to interfere with potential future investigations and/or legal proceedings.
- Promptly prepare an audit or evaluation report that includes all significant or material instances of noncompliance.
- Promptly inform the Audit Director about any illegal acts that could result in criminal prosecution.

Management Controls **– Auditors should obtain an understanding of management controls that are relevant to the audit. When management controls are significant to audit objectives, auditors should obtain sufficient evidence to support their judgments about those controls.**

Management controls refer to the plans, methods and procedures adopted by management to ensure that its goals are met. While most audits require an assessment of management controls, the need for and the focus of the assessment varies with audit objectives. The important steps are as follows:

- Clearly define audit objectives and identify the management controls that relate to those objectives.
- Determine how much testing is required to meet audit objectives with appropriate reliance on management controls. The extent to which management controls can be relied on to reduce audit testing depends on the existence and effectiveness of those management controls that relate to the audit objectives.

***Evidence* – Sufficient, competent and relevant evidence is to be obtained to afford a reasonable basis for the auditors' findings and conclusions. A record of the auditors' work should be retained in the form of working papers. Working papers should contain sufficient information to enable an experienced auditor having no previous connection with the audit to ascertain from them the evidence that supports the auditors' significant conclusions and judgments.**

Work papers are the link between data gathering and analysis and the communication product. They document, in a complete and understandable way, what was done to meet audit objectives; the evidence that supports findings, conclusions and recommendations; and who prepared and reviewed them. Work papers may include tapes, films, photos and disks. Evidence must be the best and most reliable that is available by effectively applying professional audit and evaluation methods. It must be sufficient to lead a reasonable person to the same positions as those taken by the auditor.

Computer-processed data are frequently an important part of audit evidence in audits and its reliability can be crucial to audit objectives. Staff should not assume that computer-based data are reliable. Staff must ensure that the data's relevancy and reliability are established. This requires data testing and/or an assessment of management controls in the system that produced the data.

REPORTING STANDARDS

Reporting standards cover form, timeliness, contents, presentation and distribution. Guidance on each of these standards is included below.

***Form* – Auditors should prepare written audit reports communicating the results of each audit.**

Written reports help communicate the results of audits to management and make the results less susceptible to misunderstanding. They also facilitate follow-up to determine whether corrective action has taken place.

***Timeliness* – Auditors should appropriately issue the reports to make the information available for timely use by management, legislative officials and other interested parties.**

The results of the auditor's work must be communicated in time to meet the needs of the users. In addition to final products, auditors are encouraged to pursue periodic and less formal communication of the status of work with interested parties.

Report Contents

- **Objectives, Scope and Methodology – Auditors should report the audit objectives and the audit scope and methodology.**

  Every report must contain some brief introductory material that provides important information on the agency, program, activity or function discussed. The introductory material also states the scope and objectives of the review and explains the methodology used to meet the objectives. The information is needed to understand the audit's purpose, to judge the merits of work done and what is reported and to understand any significant limitations.

- **Audit Results – Auditors should report significant audit findings and, where applicable, the auditor's conclusions.**

  The findings and conclusions of each audit product should be consistent with the evidence on which they are based and responsive to the audit's objectives. Findings and conclusions should provide a sound basis for any recommendations that will be included.

- **Recommendations – Auditors should report recommendations for actions to correct problem areas and to improve operations.**

  When feasible, the auditors work with the auditee(s) to solve problems during the course of the review and to assist in developing an action plan to address and implement recommendations for those problems that can not be solved immediately. The auditor may follow up on selected recommendations to ascertain whether the action plans and recommendations have been satisfactorily implemented. Recommendations should be:

  - Action-oriented. They should be directed to those who have responsibility and the authority to act. They should be as specific as the subject matter permits, convincing and positive in tone and content.
  - Effective. They should deal with the underlying causes of any problem detected during the review. They should be feasible and cost-effective. They should be based on consideration of various alternative corrective actions that could be taken.

- **Statement on auditing standards – Auditors should report that the audit was made in accordance with generally accepted government auditing standards.**

  Some audits may not be designed specifically to meet all generally accepted government auditing standards (GAGAS). Reports for such projects should state which standards were meant to be followed.

  Compliance with laws and regulations -- Auditors should report all significant instances of noncompliance and all significant instances of abuse to the Audit Director that were found during or in connection with the audit.

  - When auditors feel that it may be necessary to report potentially illegal acts to the appropriate authorities, they should first consult legal counsel prior to making the report. They should limit their reporting to matters that would not compromise an investigation or legal proceedings.
  - When auditors detect less significant instances of noncompliance they should communicate them to the auditee, preferably in writing. If communicated in a management letter, auditors should refer to that letter in the audit report. Auditors should document in their work papers all communications to the auditee about noncompliance.

- **Management controls – Auditors should report the scope of their work on management controls and any significant weaknesses found during the audit.**

  If the auditor's assessment shows that management controls are effective, the report should describe the controls that were tested, state that the controls were logically designed and consistently followed and describe the tests that were performed on the controls.

If assessment shows that management controls cannot be relied upon, the report should describe the controls that were tested, state that the controls were not properly designed and/or implemented and describe the alternate steps and additional tests done to ensure that the transactions were properly handled and recorded. Significant management control weaknesses identified in the auditee's work typically are presented as causes of problems or deficiencies and should be accompanied by recommendations for corrective action.

- **Views of auditee -- Auditors should report the views of managers of the audited program concerning auditors' finding, conclusions and recommendations, as well as corrections planned.**

  Auditees and other affected parties should be given the opportunity to provide comments on reports issued under this program. Written comments are preferred on draft reports and are required when the issues are particularly sensitive or controversial.

- **Accomplishments – Auditors should report noteworthy accomplishments, particularly when management improvements in one area may be applicable elsewhere.**

  Inclusion of favorable findings helps to convince departments of the fairness and integrity of the office's work and of the need to act on its recommendations. It also provides information on management improvements that may apply elsewhere.

- **Issues needing further study – Auditors should refer significant issues needing further audit work to the auditors responsible for planning future audit work.**

  When the work of the office brings up issues needing further study beyond the scope of the present audit, staff should either refer the matter to the departments or consider future work.

- **Privileged and confidential information**

  If certain information in a request is prohibited from general disclosure, auditors should discuss the information with the Audit Director and then report the nature of the information omitted and the requirement that makes the omission necessary.

Report Presentation

The report should be complete, accurate, objective, convincing and be as clear and concise as the subject matter permits. Audit products should:

- Contain enough information to provide an adequate understanding of the matters reported.
- Present the results of the audit work in an unbiased manner and include enough information to be persuasive.
- Be error free to assure users and readers of product reliability. All factual data must be verified.
- Be clear and not assume that the reader has detailed technical knowledge of the subject. When technical terms, acronyms or unfamiliar abbreviations must be used, they should be clearly defined.

- Be no longer than necessary to communicate the message. The readers should not be burdened with unessential details.
- Persuade readers of the importance of the findings and the reasonableness of any conclusions and recommendations.

Report Distribution

Written audit reports are to be submitted by the audit organization to the appropriate officials of the auditee and to the appropriate officials of the organizations requiring or arranging for the audits, including external funding organizations, unless legal restrictions prevent it. Copies of the reports should also be sent to other officials who may have legal oversight authority or who may be responsible for acting on audit findings and recommendations and to others authorized to receive such reports. Unless restricted by law or regulation, copies should be made available for public inspection.

Appendix B – Exemplar Evaluation/Audit Program Plan

[This exemplar can serve as a template for developing an evaluation/audit program plan. It can be adapted or tailored to meet the needs of the evaluating organization.]

[Name of organization] Evaluation/Audit Program Plan

Chapter 1 – Policy

- Policy
- Program authority
- Types of program evaluations to be conducted
    - Compliance/conformance
    - Efficiency & effectiveness
    - Financial management
    - Results and outcomes
    - Options analysis
    - Other
- Reporting
- Quality Control & Quality Assurance

Chapter 2 – Evaluation/Audit Planning

- Evaluation/audit objectives
- Planning factors & Assumptions
- Scope
- Methodology
- Testing the audit or evaluation plan
- Preparing the evaluation/audit plan

Chapter 3 – Data Gathering & Analysis

- Fieldwork Plan
- Collecting and analyzing data
- Progress reporting

Chapter 4 – Evidence

- Types of evidence
    - Physical
    - Testimonial
    - Documentary
    - Analytical
- Standards of evidence
    - Competent
    - Relevant
    - Sufficient
- Using evidence supplied by others
- Meeting the standard of evidence

Chapter 5 – Audit Findings, Recommendations and Corrective Actions

Types of findings and recommendations

- Elements of a finding
    - Condition
    - Criteria
    - Cause
    - Effect
    - Recommendation
- Follow-up and monitoring process
- Recommendations and reporting

Chapter 6 – Documentation & Archiving

- Policy
- Responsibilities
- Security of data
- Documentation & archiving process
- Document retention guidelines

Appendix C Exemplar Audit Plan

[This exemplar can serve as a template for developing a program or project-specific audit plan. It can be adapted or tailored to meet the needs of the evaluating organization.]

[Name of auditing organization] Audit Plan

Chapter 1 - Audit Policy

- Parent Organization Audit Program/Policy

  [What is the policy of the parent organization (government, NGO, agency, etc.) regarding the conduct of evaluations/audits? Are evaluations being conducted as part of a larger assessment effort? Are they being done in accordance with higher-level requirements, regulations, guidance? What will be done with evaluation/audit results? And so on...]

- Evaluating Organization Policy

  [What is the policy of the evaluating organization? Why are evaluations/audits being conducted? What will be done with the information developed? And so on...]

Chapter 2 - Objectives & Scope

- Conduct an evaluation/audit of [Project Name] with specific reference to [Outcomes as specified in the project workplan ...or...other functions, facilities, program elements];
- Audits will focus on: regulatory compliance and best management practices; conformance with project objectives; specific indicators [or other areas] ...auditors will also seek to identify areas of increased risk or liability as a basis for guiding and structuring future evaluation/audit activities.
- [Evaluate project outcomes as they support IFM activities].

Chapter 3 - Audit Methodology

- The Audit Team will conduct audits in accordance with established procedures and protocols. Protocols and procedures may be adapted as circumstances dictate.
- [document review, structured interviews, questionnaires and surveys of randomly-selected program staff, project site visits, statistical analysis of flood effects data, ...].
- [See Attachment __ for Data Sampling & Analysis Plan].

Chapter 4 - Audit Schedule [Schedule should be as detailed and complete as possible, to inform and guide both the auditors and the program staff.]

- Briefings
- Site visits and field work
- Document reviews
- Staff interviews
- Etc.

Chapter 5 - Sequence of Audit Activities

- Pre-Audit Data Gathering – The Lead Auditor will communicate with the Program Representative approximately 2-4 weeks prior to the audit to solicit basic information regarding the facility and the types of information and documentation that the Audit Team will want to examine later in the audit.

- Records Review – Members of the Audit Team will conduct a review of all relevant records and documentation, including: [pertinent program/project records, memos, implementation plans, monitoring records, etc...] This records review will form part of the audit documentation.
- Entry Briefing – At the beginning of the on-site audit, the Lead Auditor will conduct an initial meeting/briefing with the Program Representative and staff to discuss the scope of the audit, Audit Team activities and requirements, a schedule for staff interviews and other important aspects of the audit process.
- On-Site Audit – The Audit Team will thoroughly tour [project sites] to observe operations, identify potential problems and best management practices, interview staff regarding project activities and record their findings. The site visit portion of the audit may require ___ days with a Team of ___ auditors, depending on the size and complexity of the project site and the level of detail specified for the audit.
- Exit Briefing – At the completion of the [on-site] audit, the Lead Auditor will meet with the Program Representative and staff to discuss the conduct of the audit, identify significant findings and outline the remainder of the audit process. It is possible that some findings will have been addressed or corrected prior to the completion of the audit and the Lead Auditor will so note.
- Legal Review – A draft audit report will be submitted to Legal Counsel for review within [a short period of time] after completion of the audit. This review will focus solely on matters of regulatory citation and clarity of finding descriptions and will be completed within ... days.
- Audit Report – The Audit Report will identify all aspects of the program/project that were evaluated, the date(s) of the audit, members of the auditing team and program staff that participated. Audit Reports will be distributed to the program representative, to the appropriate Division Director and to the [parent organization] Director within [time period] of completion of the [on-site] audit.
- Corrective Action Plan (CAP) – The Program Representative is responsible for preparing a Corrective Action Plan to address the evaluation/audit findings. The Program Representative will provide a copy of the CAP to the Lead Auditor within [...] working days after receipt of the Audit Report. The CAP will serve as a tool for both the Lead Auditor and the Program Representative to monitor progress of the corrective action.

  The program staff shall correct findings within 90 days from the issuance of a final audit report, unless otherwise indicated or where a different schedule for completion is noted in the CAP. The Program Representative will work with all appropriate operations, financial, environmental and other staff (such as the Legal Counsel) to develop a CAP, taking into consideration the recommendations made in the Audit Report.

- Follow-up Inspection – At the discretion of the Lead Auditor, a follow-up inspection may be conducted by a member of the Audit Team to determine if the findings have been corrected in a timely manner. Results of the follow-up inspection will be documented in a memo report with the same distribution as the Audit Report.

Chapter 6 - Audit Checklists/Protocols

Auditors will develop and use a set of standard auditing checklists covering the specific activities, objectives and circumstances of an individual program. The use of standard checklists will provide a degree of uniformity and comparability among project audits and will facilitate comparison to similar projects in other program areas. In addition, the audit checklists will be structured in a format and level of detail that will assist the Program Representative in taking corrective action and in maintaining continuity within the program.

Chapter 7 - Composition of the Audit Team

- Audit Team requirements

  The Lead Auditor shall be a skilled and experienced auditor. Among the desired qualifications, the lead auditor shall have had appropriate training in leading financial or performance audits, prior experience in performing program evaluations of similar programs or projects and experience with the type of regulatory and performance issues applicable to the program or project.

  The Lead Auditor may retain additional assistance, from other organization staff or from external consultants, to support the auditing functions. Additional auditors shall also be independent and unbiased and have the necessary expertise to carry out their auditing responsibilities.

  Audit Team members must be able to carry out an independent, knowledgeable, unbiased audit. Audit team members shall have appropriate training in financial or performance audits and experience with the type of activities conducted under the program or project.

  Program Representative – an individual from the program or project being audited may assist the Audit Team by acting as a guide and insuring access to all relevant information. The facility representative should have knowledge of the program being audited and have access to individuals and information pertinent to the audit.

- Auditor Training [Identify specific training requirements for this specific audit/evaluation]

Chapter 8 - Roles and Responsibilities

- Lead Auditor – responsible for ensuring efficient and effective conduct and completion of the audit within the audit scope and plan.

  - direct the activities of the Audit Team;
  - develop the audit plan
  - coordinate with the Program Representative regarding audit objectives, methods and activities;
  - schedule the audit with the Program Representative;
  - obtain the records and other relevant project data/information for the audit;
  - identify the regulatory scope of the audit and determine the appropriate checklists, protocols, etc.;
  - ensure that the standard procedures, methodology and protocols specified in this Plan are followed;
  - develop a concise Audit Report that identifies problems, concerns, best management practices, etc.;
  - distribute the report, as appropriate;
  - conduct appropriate follow-up review on Corrective Action Plan implementation.

- Audit Team – supports the Lead Auditor in carrying out audit activities
  - plan and carry out audit tasks under the direction of the Lead Auditor;
  - collect and analyze relevant and sufficient audit evidence to determine audit findings and reach specific audit conclusions;
  - prepare working papers, as appropriate;

- document audit findings;
- assist in preparing the audit report.

- Program Representative.
  - communicate the objectives and scope of the audit to program staff;
  - provide facilities, as needed, for the Audit Team;
  - appoint responsible and competent staff to assist the Audit Team, to act as guides and to ensure that the Audit Team are aware of specific site requirements (e.g., health and safety practices);
  - provide access to facilities, personnel and relevant information and records as requested by the Audit Team;
  - cooperate with the Audit Team in meeting the objectives of the audit.

- [Parent organization or evaluating organization] Legal Counsel

  The Legal Counsel is responsible for providing regulatory interpretation and legal counsel, as necessary and as requested, related to the development and implementation of the audits. The Legal Counsel shall also assist as requested in determining relative risk and potential liability, confidentiality requirements, appropriate actions to take to correct findings and approaches to regulatory agency interactions regarding findings and corrective actions.

Chapter 9 - Audit Data Management & Documentation

- Working papers

  All audit working papers, audit checklists (with the exception of informal auditor's notes) and draft audit reports will be retained. At the discretion of the Lead Auditor, selected audit checklists may be provided to the program representative to assist in the completion of corrective actions, in the development of management programs or in the training of program personnel.

- Audit report – distribution and records

  All documentation produced before or during the audit, draft and final audit reports and Corrective Action Plans will be labeled CONFIDENTIAL, SUBJECT TO SELF-EVALUATION PRIVILEGE and DO NOT DISSEMINATE. Audit Reports will be distributed to the program representative, to the appropriate management official and to the [parent organization] Director. E-mail shall not be used to communicate on any substantive aspects of the audit

  Files of the audit, audit reports and Corrective Action Plans shall be kept confidential and will be stored in a central location. Files shall be available to persons as determined by the [parent organization] Director to be necessary to carry out job responsibilities.

Attachments [as necessary]

For more information, please contact:

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