

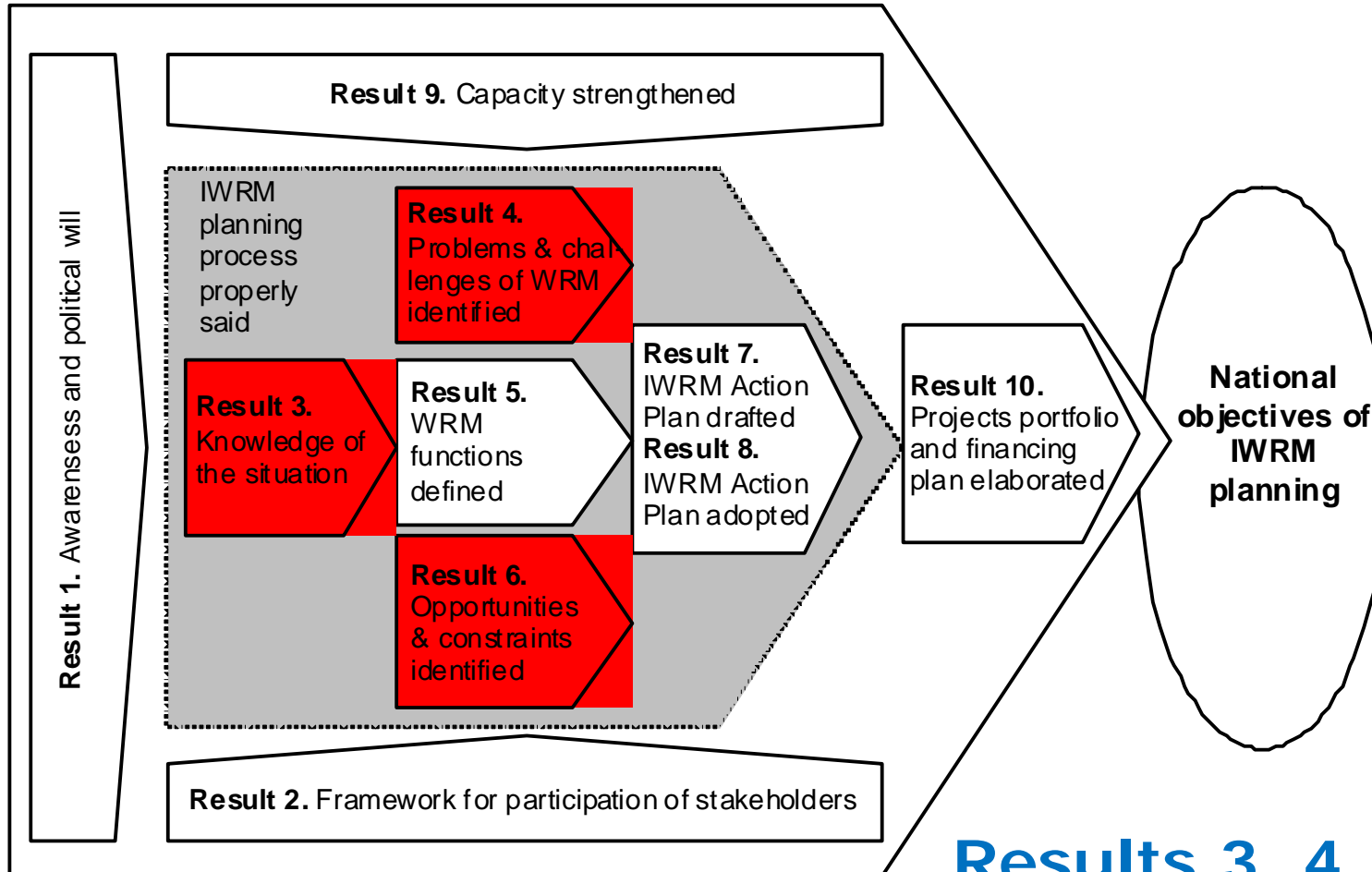
Prioritisation of Water Resources Issues using the WRIAM Method

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Objective

- Participants achieves an insight into the Water Resource Issues Assessment Method – WRIAM
- Thereby enabling the prioritisation of issues in catchments as part of a structured situational analysis.

10 Results expected from the IWRM Process



**Results 3, 4, 6
= Situational Analysis**

Situational Analysis

- The starting point for an IWRM Action Plan: « *Knowing where you are in order to find out where you are going or you can go* »
- Compilation of existing knowledge on water resources issues
- Identify problems and challenges related to water resources and their management framework in a national context (including assessment of human resources)
- Rank (prioritise) the problems: there will not be sufficient resources (human and others) to do everything in an IWRM Action Plan
- Identify the constraints and opportunities (including international agreements with neighbouring countries, external assistance etc.)
- A pragmatic approach is essential on all these points

Situational Analysis

Describe and rank the water resources problems:

Surface water - quantity

Surface water - quality

Groundwater - quantity

Ground water - quality

Water related risks

Identify hot spots in one or the other of these domains (for example degraded aquatic environments)

Describe management problems (no ranking : all are important !)

National water policy

IWRM Roadmap

Water law reflecting IWRM (and other legal text concerning water)

Regulating texts

Institutional and organisational framework appropriate to IWRM

Human resources qualified in IWRM

The sectors financial framework and appropriate management of financial instruments

Address challenges – Constraints and opportunities



Situational Analysis

How to rank the water resources problems?

One way would be to use the WRIAM Method being developed by DHI (Water Resources Issues Assessment Matrix)

Principles of the method

The method is used against water resources issues. It is not against water resources management issues !

The country is subdivided into river basins and aquifers

The method has been developed to allocate quantitative values to more or less subjective judgments.

And at the same time have:

A quantitative assessment of problems that can be organised according to their importance (ranking)

A monitoring system which can be used again in the future to re-examine the problems and importantly to measure the effects of actions taken to address the problems

WRIAM – Water Resource Issues Assessment Method

- Derived from the screening and ranking techniques used in RIAM (Rapid Impact Assessment Matrix)
- The RIAM method is used for EIA, whereas the WRIAM method focus on water resources issues
- Method advantage - Objective and robust technique for assessing and prioritizing water resources issues

WRIAM – Water Resource Issues Assessment Method

- Developed and tested in Burkina Faso, where 107 potential water issues problems were identified and ranked - now forming the basis for actions in the Integrated Water Resources Management Plan
- Modified and applied in Uganda, where 93 potential water issues problems were identified and ranked - presently forming basis for Issue Based Water Resources Management
- Still under development !

Definitions

- Water resource issues are the basic problems which affect water users directly
- Example of problems: pathogenic pollution, eutrophication, pesticides, insufficient availability of water

Definitions

Water users:

- Domestic users
- Livestock
- Agriculture (including irrigation)
- Manufacturing industries (including mining)
- Energy production
- Transport (waterways)
- Recreation/tourism (related to water)
- Fishing industry
- Ecosystems (maintenance of ecosystems in streams and surface water reservoirs)

WRIAM - Concept

The identified water issues is evaluated against two groups of criteria:

(A) Criteria related to the importance of the issue or effect, and which can individually change the score obtained considerably;

(B) Criteria that are of value to the given situation, but individually have a lesser effect on the score obtained.

WRIAM operates with 5 criteria

Two group A criteria:

Criterion A1: Importance of condition (spatial boundaries or human interests it will affect)

Criterion A2: Magnitude of change / effect (scale of disbenefit of an impact or a condition)

Three Group B criteria:

Criterion B1: Permanence (Temporary/Permanent)

Criterion B2: Mitigation/Reversibility

Criterion B3: Cumulative character

Scoring related to Criteria A1 - Importance

Importance is assessed according to the degree of impact on human interests

A1 = 0 No importance

A1 = 1 Only important locally

A1 = 2 Important to areas also immediately outside the local

A1 = 3 Important to regional / national interests

A4 = 4 Important to national / international interests

Scoring related to Criteria A2 - Magnitude

The magnitude of the problem is assessed as a measure of degradation in the situation related to status quo (maintenance of natural conditions)

A2 = 0 No change of status quo

A2 = 1 Negative change related to status quo

A2 = 2 Significant negative disbenefit or change

A2 = 3 Major disbenefit or changes

Scoring related to Criteria B1 - Performance

Permanence defines whether the water resources problem is permanent or temporary

B1 = 1 No change / not applicable

B1 = 2 Temporary

B1 = 3 Permanent

Scoring related to Criteria B2 - Reversibility

Reversibility defines whether the water resources problem can be reversed or mitigated and thereby gives a measure of the possible control of the problem.

B2 = 1 No change / not applicable

B2 = 2 Reversible

B3 = 3 Irreversible

Scoring related to Criteria B3 - Additivity

Accumulative defines whether the implications of a water resources situation are simple or whether they will accumulate over time or potentially aggravate other problems

B3 = 1 Light or no cumulative character / not applicable

B3 = 2 Moderate cumulative character

B3 = 3 Strong cumulative character

WRIAM Score of the Issue

The calculation of the overall score of an issue is simple:

$$(A1) \times (A2) = At$$

$$(B1) + (B2) + (B3) = Bt$$

$$(At) \times (Bt) = ES \text{ (Overall score)}$$

Where,

At is the result of multiplication of all A scores

Bt is the result of summation of all B scores

ES is the overall score of importance for the condition considered. It can be from 0 to 108.

Assessment of obtained score

The overall scores are then converted into range bands that define the importance/impact of the issue

Score ES	Range Value (RV)	Assessment
0	0	No importance
1 to 9	1	Slight negative impact
10 to 18	2	Moderate negative impact
19 to 35	3	Negative impact
36 to 71	4	Significant negative impact
72 to 108	5	Major negative impact

Example - Gambia

Issue (No)	Problem Type	Object 1/ Sub-them	Object 2/ Theme	Effect/Nature	Cause	Group A Criteria		Group B Criteria			Overall Score	Range Value
		Quality / Quantity	Surface Water /Groundwater			Geo- graphical extent of water users affected	Seriousness of the effect/ Urgency for action	Frequency	Mitigation	Cumulative Character		
57	Impact	Quality	Surface water	Suspended solids	Deforestation	3	3	3	2	3	72	5 : Major negative impact
26	Impact	Quality	Surface water	Eutrophication	Erosion	2	2	2	2	3	28	3 : Moderate negative impact
91	Risks	Quantity	Surface water	Erosion	Floods, intensive rain	2	2	2	2	2	24	3 : Moderate negative impact
1	Impact	Quality	Surface water	Pathogenic contamination	Floods, intensive rain	2	2	1	2	1	16	2 : Negative impact
2	Risks	Quantity	Surface water	Damage to infrastructure	Floods, intensive rain	1	2	2	2	2	12	2 : Negative impact
3	Impact	Quality	Surface water	Eutrophication	Rural domestic waste	1	2	2	2	1	10	2 : Negative impact
4	Impact	Quality	Surface water	Suspended solids	Erosion	1	2	1	2	2	10	2 : Negative impact
5	Impact	Quality	Surface water	Eutrophication	Animal excreta	1	1	2	3	2	7	1 : Slight negative impact
6	Impact	Quality	Surface water	Phosphate pollution	Agriculture	1	1	2	2	2	6	1 : Slight negative impact
7	Impact	Quality	Surface water	Eutrophication	Agriculture	1	1	2	2	1	5	1 : Slight negative impact
8	Impact	Quality	Surface water	Eutrophication	Atmospheric deposition	1	1	1	3	1	5	1 : Slight negative impact
9	Impact	Quality	Surface water	Suspended solids	Aquatic floating macrophytes	1	1	2	2	1	5	1 : Slight negative impact
10	Impact	Quality	Surface water	Nuisance	Aquatic floating macrophytes	1	1	2	2	1	5	1 : Slight negative impact
20	Risks	Quantity	Surface water	Increase in water born diseases	Dams, reservoirs, other physical structures	1	1	2	2	1	5	1 : Slight negative impact

Level of documentation

A problem / issue cannot be well characterised if the documentation is poor. Often insufficient data is available to assess the problem. We have therefore incorporated a criteria to describe the level of documentation.

0 = No documentation

1 = Little concrete information

2 = Monitoring information available but insufficient in amount and/or in quality

3 = Good documentation in the form of quality monitoring information

Types of Water Resources Issues

The WRIAM method operates with four types of water issue problems:

- I Impact on the resource - *Human activities leading to a decrease of quality or quantity in relation to user requirements*
- II Demand or availability of the resource - *availability or quality of the resource does not correspond with requirements for exploitation of the resource*

Types of Water Resources Issues

The WRIAM method operates with four types of water issue problems:

- III** Mobilization of the resource - *difficulties with mobilization of the resource e.g. establishment of productive boreholes*
- IV** Risks & harmful effects of the resource, social and economic impacts on the users - *negative effects to the human community due to the presence of water e.g. water born diseases*

Type I – Impact of the Resource

- Excreta (human and animal)
- Domestic waste (urban and rural)
- Urban run-off
- Municipal and industrial waste
- Livestock parasite control
- Agriculture (including irrigation)
- Aquaculture
- Erosion
- Combat of vector diseases
- Mining
- Transport
- Atmospheric deposition
- Aquatic floating macrophytes
- Energy production
- Abstraction for water supply (urban, rural, livestock, irrigation, industries, mining)
- Impounding (dams and reservoirs)
- Deforestation
- Natural conditions

Type I – Impact of the Resource

Example

Issue (effect)

Eutrophication

Cause

Excreta (human, animal)

Domestic waste (urban, rural)

Municipal, industrial waste

Agriculture

Aquaculture

Erosion

Atmospheric deposition

Type II – Demand / Availability of the Resource

- Urban and rural water supplies
- Livestock
- Irrigation
- Industries
- Hydropower
- Ecosystems (maintenance of river and lake ecosystems)
- Fisheries
- Neighbouring countries
- Tourism/recreation

Type III – Mobilisation of the Resource

- Possibilities of establishing productive boreholes
- Mobilisation potential (possibilities of finding suitable sites for building dams)
- The capture/collecting technology
- The total demand compared to the mobilizable resource (with available technology)

Type IV – Risks/Harmful Effects from Resource

- Floods (loss of life, damage to infrastructure, loss of crops)
- The role of water in relation to water born diseases and epidemics
- Gender issues
- Accidents (e.g. drowning) because of reservoirs
- Economic problems related to e.g. purchase of water

Grouping

To facilitate the analysis the WRIAM method address the identified water issue problems to:

- Problems affecting Quality or Quantity of the water resource, and
- Problems concerning surface water or groundwater

Issue Overview

Water Resources
Issue

Problem type

Impact

Demand/Availability

Mobilisation

Risks/Harmful effect

Affecting/addressing

Quantity

Surface water

Quality

Groundwater

Summary of Ranking

Water Resources Issue

Overall

Group A Criteria
A1: Geographical extend of users affected
A2: Seriousness effect/urgency

Group B Criteria
B1: Permanence
B2: Mitigation/Reversibility
B3: Cumulative character

Complimentary score

Documentation

WRIAM matrix



WRIAM – Group work

- Selection of major catchment in the group
- Identification of issues with relevance to this catchment
- Ranking of issues using WRIAM

Thank You



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