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Mainstreaming of Environmental Flows into
Integrated Water Resources Management
in the WIO Region: A Workshop for
Managers and Policy-Makers

25-27 November 2019
Cape Town, South Africa

MEETING REPORT FOR MAINSTREAMING OF ENVIRONMENTAL FLOWS INTO INTEGRATED WATER RESOURCES MANAGEMENT IN THE WIO REGION: A WORKSHOP FOR MANAGERS AND POLICY- MAKERS

1. Background

Environmental Flows (EFlows) are the magnitude, frequency, timing, and quality of water and sediment flows necessary to sustain freshwater and estuarine ecosystems and the human livelihoods and well-being that depend on these ecosystems1.

EFlows Assessments provide information on the links between river flows and river health, and in their most comprehensive form they predict basin-wide ecological and social outcomes linked to different water management options2. As such they can generate vital information on how river ecosystems function, and what is needed in terms of water quantity, water quality and sediment regimes to support various levels of ecosystem services. When this information is provided as a series of scenarios of potential water management options, it creates awareness and facilitates discussion and negotiation of possible futures among a range of stakeholders. As such it is central to Integrated Water Resource Management (IWRM)3, which should balance the use of water for multiple outcomes4.

2. Aims and expected outcomes of the Workshop

The overall objectives of the workshop were to introduce the WIO EFlows Guidelines and share experiences on the relevance and mainstreaming of E-Flows in Integrated Water Resource Management (IWRM) in the region. Specific objectives included enhanced understanding of the:

- ecosystem goods and services provided by river basins;
- links between river-basin processes and the coastal and marine environment;
- contemporary drivers of change facing river basins in the region;
- policy/legal/institutional frameworks for river flows management in the region;
- participatory negotiation of objectives for river and estuarine ecosystem management;
- developing managerial and technical capacity in EFlows.

The workshop focused on the value and application of EFlows in IWRM, and related frameworks, such as SDGs and Aichi Targets. Accordingly, it included presentations and practical sessions on:

- the nature and functioning of river systems, and the impacts of water-resource developments;
    - policy frameworks and EFlows in practice, where participants shared their experiences on the adoption and application of EFlows in their countries

[1] Amended from Brisbane Declaration (2007)
[2] King and Brown (2018)
[3] Dyson et al. (2003)
[4] Overton et al. (2014)

- with reference to EFlows in WIO countries;
- negotiating objectives for river and estuarine ecosystem status;
- managing an EFlows Assessment: Tools and guidance;
- building managerial and technical capacity in EFlows;
- EFlows information systems;
- case studies.

3. The WIO EFlows Guidelines

The Guidelines on EFlows Assessments for the Western Indian Ocean (WIO) region (WIOSAP 2019) were launched during the regional inter-governmental meeting of the 3rd Project Steering Committee of the WIOSAP Project on the 26th of June 2019 in Durban.

The Guidelines provide support on EFlows Assessments for rivers and estuaries[5] with a view to enabling a harmonized approach to such assessments across the region in order to enhance protection of the WIO, in particular the near-shore ecosystems. The document is intended for use by government agencies responsible for river basin management, national research institutions, regional organizations and civil society organizations playing a role in the management of water resources.

The Guidelines focus on EFlows Assessments, including EFlows Assessment methods and the information provided by different methods; undertaking an EFlows Assessment and managing data limitations. They also provide guidance on mainstreaming EFlows, in particular building technical capacity in EFlows Assessments.

[5] Excludes groundwater contributions directly into the marine environment.

4. Workshop facilitators

Prof. Cate Brown, one of the authors of the WIO Guidelines, was the main facilitator for the Workshop. She was supported by:

- Dr Jared Bosire (UNEP)
- Prof. Jackie King – this year's Stockholm Water Prize Laureate (Southern Waters)
- Ms Lara van Niekerk (CSIR)
- Dr Karl Reinecke (Southern Waters)
- Dr Alison Joubert (Southern Waters)
- Prof. Japhet Kashaigili (Chair of WIOSAP Regional Task Force on River Flows).

5. Meeting Documents

All meeting documents for each of the workshop are available for download from:

https://www.nairobiconvention.org/Meeting%20Documents/November%202019/Workshop%20on%20Mainstreaming%20of%20Environmental%20Flows/E-Flows%20Workshop/

6. Next steps

The next steps recommended for the WIO EFlows process are:

a) Enhanced awareness of the application of EFA in IWRM
b) Capacity building in EFA taking advantage of the WIOSAP demo projects
c) Establishment of a community of practice on EFA hosted by the Nairobi Convention
d) Production of a regional case studies report on EFA for shared learning

The execution mechanisms on these recommendations will be established in due course.

7. Annex

7.1 Workshop schedule and Agenda

The daily schedules covered the following broad areas:

- Day 1: Concepts and methods
- Day 2: EFlows in practice and associated outcomes as case studies
- Day 3: Mainstreaming the uptake of EFlows.

The sessions were a mixture of PowerPoint Presentations, open discussions and information sharing, and practical sessions designed to highlight key aspects of the workshop content.

Agenda

Day 1: Concepts and methods		
Time	Topic	Facilitator
08:30	Registration	Nairobi Convention
09:30	Welcome and introduction Opening Workshop agenda	NC S. Africa Japhet Kashaigili
01:00	The nature and functioning of river systems, and the impacts of water-resource developments	Cate Brown
10:30	TEA/COFFEE BREAK	
10:10	Experiences in IWRM from different WIO countries: Policy and programmatic interventions	Japhet Kashaigili
12:30	Introduction to EFlows for rivers: Concepts and methods	Winfred Mbungu
13:00	LUNCH BREAK	
14:00	Ecosystem modelling approach to EFlows Assessment and Management	Cate Brown
14:20	**Group practical sessions:** Identifying EFlows for indicators. See Section X.	Cate Brown/ Alison Joubert
15:20	TEA/COFFEE BREAK	
15:50	Introduction to EFlows for estuarine and marine environments: Concepts and methods	Lara van Niekerk
16:20	**Open discussion sessions: Identifying ecosystem services of estuaries** Participants discussed ecosystem services provide by estuaries and marine environment, and the kinds of flows needed to maintain them.	Lara van Niekerk
16:45	Group practical sessions feedback	
17:15	Closure	

Day 2: EFlows in practice and associated outcomes as case studies		
08:30	Recap and agenda for the day	Jared Bosire
09:00	Background and overview of the WIO EFlows Guidelines	Cate Brown
09:20	EFlows in transboundary settings: Negotiating objectives for river and estuarine ecosystem status (Development Space)	Jackie King
10:00	TEA/COFFEE BREAK	
10:30	Adopting EFlows as a tool in Integrated Water Resource Management (IWRM)	Japhet Kashaigili
11:00	**Case Study:** Estuary EFlows in RSA - information provided and uses for that information	Lara van Niekerk
11:30	**Small group discussions:** Highlighting role of EFlows in the marine environment	Lara van Niekerk
12:30	LUNCH BREAK	
13:30	Feedback from group discussions	Lara van Niekerk
14:00	The South African experience: Classification and RQOs	Karl Reinecke
14:30	**Group practical sessions: Tradeoffs.** Participants worked with an Excel based model that routes flows through the Breede River basin in a downstream direction from source to sea. The model allows the user (student) to toggle flow up and down at various points of interest and calculates changes in ecological condition and flow downstream in response. The practical focussed on changes in flow along the Breede River and what the consequences could be for water supply to agriculture and the City of Cape Town and the estuary. Relevant literature is Dollar et al. 2006.	Karl Reinecke/Alison Joubert
15:00	TEA/COFFEE BREAK	
15:30	Group practical sessions: Tradeoffs. Continued	Karl Reinecke/Alison Joubert
16:00	**Case Study:** Planning with EFlows - Okavango Basin	Alison Joubert
16:30	**Case study:** Kishenganga Dam and the Hague	Jackie King
17:00	Closure	

Day 3: Mainstreaming the uptake of EFlows		
08:30	Recap and agenda for the day	
09:00	Managing an EFlows Assessment: Tools and guidance and building capacity	Cate Brown
10:00	TEA/COFFEE BREAK	
10:30	EFlows information systems	Karl Reinecke
11:00	**Group practical sessions:** Designing a wide-scale EFlows Assessment. Participants worked in country groups. They selected a basin, and used the Guidelines and other resources to design a basic Scope of Work for	Cate Brown/ /Lara van Niekerk/Karl

	an EFlows Assessment	Reinecke
12:30	LUNCH BREAK	
13:30	Group practical sessions (cont.)	Cate Brown/ /Lara van Niekerk/Karl Reinecke
15:00	TEA/COFFEE BREAK	
15:30	Group practical sessions feedback	Country representatives
16:00	Wrap-up session and next steps	Nairobi Convention South Africa
16:30	Closure	

7.2 Handouts for group practical sessions

7.2.1 Identifying EFlows for indicators

Instructions:
Read through the information below.
From the indicators provided select a maximum of 10 indicators. Give a reason for selection.
Decide on the direction of change of your indicator if the driving indicator increases.
Ask for clarification if any of the potential drivers on the list are unclear to you.

7.2.1.1 Geomorphic Indicator –sandy banks

Sandy banks are important in riverine systems as they provide structure and stability for the river channel. They are also important as habitat, both as exposed sandy banks and inundated sandy banks:
Exposed sandy banks provide the following:

- Substrate for vegetation growth
- Nesting sites for birds, reptiles, crocodiles

Inundated sandy banks provide the following:

- Substrate for macrophyte or algal growth
- Nesting sites for fish or other aquatic animals

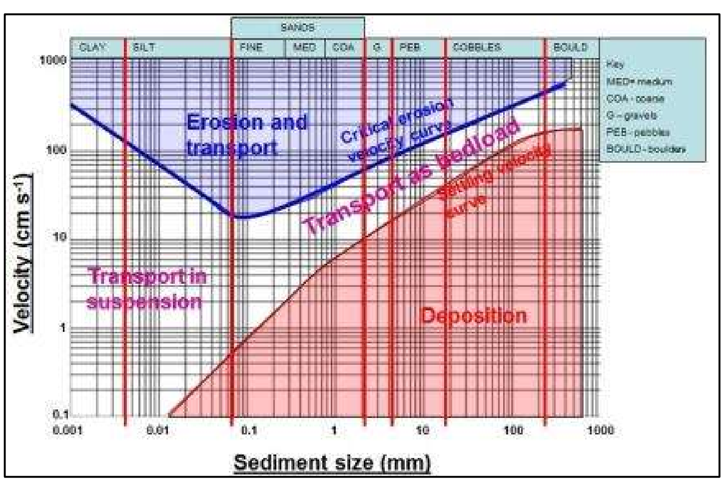
Factors affecting the distribution of sandy banks in river systems:

Factor	Influence
Sand availability	Without the availability of sand there cannot be sandy banks; Sand needs to be available for deposition following erosion

Conditions for deposition	The water velocity (shear stress) of the location must be conducive for the deposition of sand. If the velocity is too high, the sand will not be deposited and the area may become dominated by gravels, cobbles or bedrock; if the velocity is too low, than silt and / or clay will be deposited covering any sand that is present
Conditions for structural maintenance	Once deposited, sandy banks need to be maintained to provide structure to the channel and protect the floodplain margins. Sandy banks may be lost if: Water velocity increases resulting in erosion, but there is no sand deposited on the recessional limb of the hydrograph to replace and sand that was removed. Water management infrastructure that alters the relationship between flow and sediment delivery can have this impact. This includes dams, weirs or irrigation extractions; Physical removal of sand through sand mining or other activities
Conditions for habitat maintenance	Once deposited, sandy banks need to be maintained for the duration required for nesting, or seasonal vegetation growth If an exposed bank is even periodically inundated during the nesting season the nest will be lost; Similarly, if an inundated bank is even periodically exposed, fish or OAA eggs can dry out, or aquatic vegetation can be lost

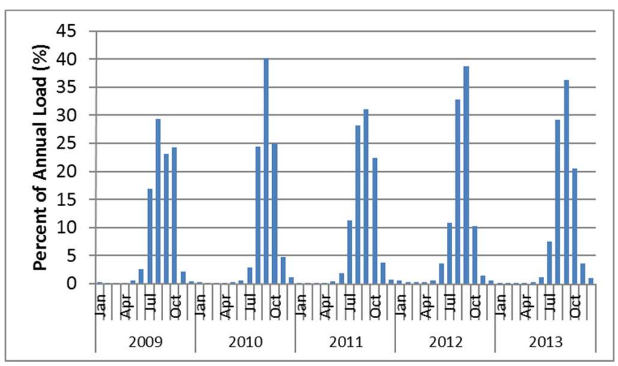
Known relationships between sediment size and hydraulics can be used to estimate when different sediment fractions may be transported or deposited.

Different grain—sizes will be transported or deposited under different flow velocities or shear stresses. Water management developments that affect water velocity or sediment availability will affect the distribution and condition of sand bars downstream.

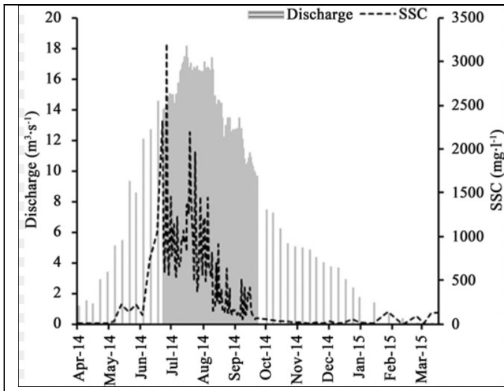
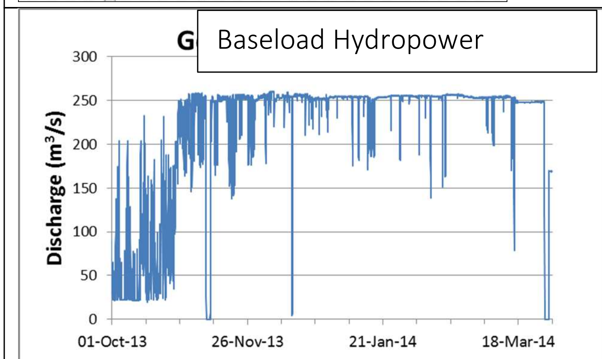
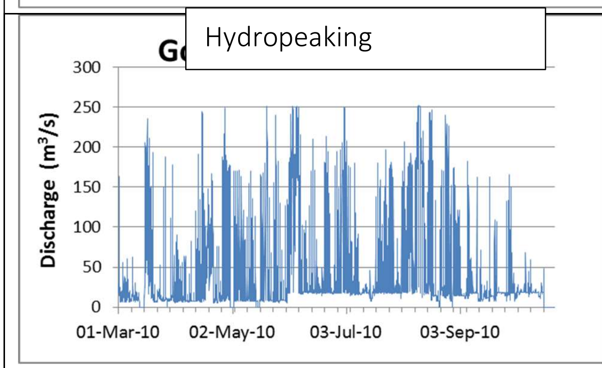


Particle classification name	Ranges of particle diameters (mm)	Critical bed shear stress (τ_c) (N/m^2)
Coarse cobble	128 – 256	112 – 223
Fine cobble	64 – 128	53.8 – 112
Very coarse gravel	32 – 64	25.9 – 53.8
Coarse gravel	16 – 32	12.2 – 25.9
Medium gravel	8 – 16	5.7 – 12.2
Fine gravel	4 – 8	2.7 – 5.7
Very fine gravel	2 – 4	1.3 – 2.7
Very coarse sand	1 – 2	0.47 – 1.3
Coarse sand	0.5 – 1	0.27 – 0.47
Medium sand	0.25 – 0.5	0.194 – 0.27
Fine sand	0.125 – 0.25	0.145 – 0.194
Very fine sand	0.0625 – 0.125	0.110 – 0.145
Coarse silt	0.0310 – 0.0625	0.0826 – 0.110
Medium silt	0.0156 – 0.0310	0.0630 – 0.0826
Fine silt	0.0078 – 0.0156	0.0378 – 0.0630

An understanding of the seasonal patterns in a river can be used as the basis for estimating change:



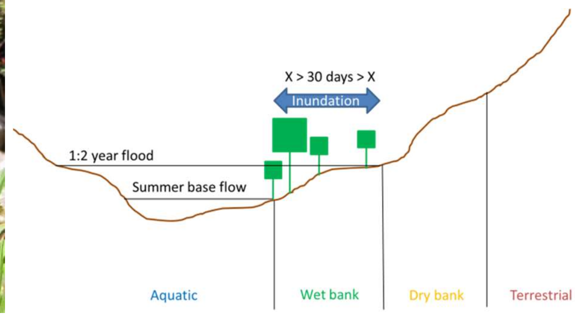
The timing of sediment loads may be important for creating and maintaining habitats. This example is from the Mekong River where the onset of sediment transport is well defined and there is a very limited periods during which most sediment is transported. Water management developments that affect the timing of sediment delivery will affect the downstream sand bars.

	In an unregulated river, there is a well-defined relationship between flow and sediment transport. There tends to be a low number of high flow events that transport large sediment loads
	If water levels remain higher than 'normal' for longer than 'normal' the deposition of sandy banks will be affected *and* the exposure of sandy banks will be affected: Fewer exposed banks More inundated banks
	If water level fluctuations increase in frequency with little sediment transport, erosion will increase it will affect the exposure and inundation of banks Banks will not be exposed or inundated long enough for successful nesting

1.1. Vegetation indicator: Safsaf Willow

<u>Species name:</u> *Salix mucronata* (Thunb) subsp. *subserrata* (Willd.) R. H. Archer and Jordan

<u>Common names:</u> Omurambandu (H), Maandumuka (L), Munengeledzi (V), Mogokare (NS), Umngcunube (X), Umnyezane (Z), Umzekana (Z), Safsaf willow (E), Wildewilgerboom (A)



<u>Distribution:</u> Occurs along rivers throughout the WIO Region.

<u>Habitat:</u> Grows along perennial river banks and mid-channel islands on the wet bank (see figure above) that is inundated every year for at least part of the year. The wet bank of a river is situated closest to the water's edge and is inundated every year by floods that provides water and deliver nutrients that stimulate growth and reproduction. These plants are adapted to grow low down on the river bank where they access water easily and all year round.

<u>Height:</u> Seldom exceeds 7m in height, tree shapes are often distorted by the force of floods.

<u>Growth form:</u> Grows as a small evergreen tree or large shrub, with drooping branches off a multi-stemmed trunk creating a wild and bushy shape. The stems and branches of this plant are flexible, moving in the wind and with flow when inundated.

<u>Characteristic features:</u> Leaves are simple, serrated, green above and grey-green or silvery below, with a red leaf stalk.

<u>Sexual reproduction:</u> Male and female flowers are inconspicuous and occur on separate plants in Spring. The female flowers are green and the male flowers have yellow stamens. Fruits mature in summer over the wet season and open in Autumn, as the floods begin to recede, to release seeds with a silky tuft for wind and water dispersal. The seeds are dispersed by wind along the river corridor in an upstream or downstream direction, depending on the wind direction. The seeds then float once they hit the water's surface and are deposited on the river bank as the flood waters recede. This means they are preferentially dispersed onto the lower sections of the river bank (wet bank) where they can access the water they need to grow all year round. The seeds germinate and grow into seedlings quickly that take root easily into a variety of different sediments, including nutrient poor sand.

<u>Asexual reproduction:</u> The wet bank is inundated by large floods that submerge small trees and scour through their canopies breaking off stem fragments that are dispersed

downstream. These plant fragments are called vegetative propagules because they are able to take root when deposited on the river bank as the floods recede. These plant fragments grow into new trees.

Special adaptations: The trees grow more vigorously and produce more flowers and seeds during wet years than dry years. The trees have multiple flexible stems that bend under the force of floods, absorbing energy from the water and so help reduce flood scour on the bank. The trees have fibrous root systems that bind sediments and stabilise the wet bank. If the tree gets knocked over and remains rooted in position or gets buried by sediment the plant can re-sprout to grow new stems. Restoration teams cut live branches from these trees (turions) and plant them into river banks to stabilise them.

7.2.1.2 FISH INDICATOR

a) CORNISH JACK, MORMYROPS ANGUILLOIDES

- Called Cornish Jack in English because it looks a bit like an European Pike, which is called a 'jack' when it is young.
- Also known as the African Carp, Lele, and Noagbe among other names.
- They are nocturnal and slightly electric.
- They are a fairly large fish as they can grow up to 150 cm (4.9') in length and weigh up to 15 kg.
- Emitting weak pulses of electricity, Cornish Jack can navigate murky waters successfully, communicate with its environment, and ultimately catch its prey.

Cornish jack, Mormyrops anguilloides	
Distribution	In southern Africa restricted to the middle and lower Zambezi River, and the Buzi and Pungwe Rivers. Widespread through Congo Basin and West Africa, parts of East Africa, including the Nile and Lakes Malawi, Tanganyika and Albert.
Habitat (juveniles)	Very shallow rocky habitat, with rocky overhangs for protection from predation
Habitat (overday adults)	Pools with deeper areas and rocky overhangs for cover
Habitat (overnight adults)	Open water – feeding in main channel in deep quiet area (doesn't like fast currents). Also occur below floating vegetation.
Food (juveniles - insect larvae)	Insects in general are an important component of cornish jack diet (Marshall 2011). Larger fish take large prey such as odonate larvae, but juveniles among rocks will take smaller insects. Changes in abundance of one type of prey are likely to be compensated by

Cornish jack, Mormyrops anguilloides	
	switching to other prey items. Food availability for cornish jack is thus only likely to have significant impacts if there are cumulative losses of food sources in the system.
Food (juveniles and adultsshrimp)	Shrimps were reported by Marshall (2011) to occur in about half the stomachs of fish from open water. They are thus likely to be of greater importance in the overall diet than the various other macroinvertebrate families.
Food (adults-fish)	Small cichlids up to 4-5 cm in length were reported by Marshall (2011) to be the main fish prey of Cornish Jack in Lake Kariba, with fish in general occurring in nearly 70% of stomachs of fish from open water.
Breeding	Breed in summer during the rainy season, especially abundant at the beginning and middle of the annual flood, Some suggestion that the migrate upstream to breed and retreat downstream when the water recedes. A fish species in which females release eggs at intervals over a given period (factional spawners). Mature females carry 25000 or more eggs.
	Male builds nest in fine sediment and guards eggs and offspring
Age	Lives about 8 years

b) ALWAN SNOW TROUT

Schizothorax plagiostomus	Alwan Snow Trout	It has an elongated body with projecting, inferior and wide mouth. The lower Jaw has a keratinised cutting edge. Lower lip fold expanded and papilose.A series of enlarged scales are present along the anal fin base. Scales very small, almost 100 in the lateral line. It has dark grey color on dorsum, lighter on sides and silvery white below. Often small dark spots scattered over sides, more prominent in smaller specimens (Heekle, 1838)

Schizothorax plagiostomus (Alwan Snowtrout; Heekle, 1838) is found in the rivers and streams of mountainous areas of the Himalayas, India, Afghanistan and Nepal. It is distributed throughout the river Neelum. The *Schizothorax plagiostomus* performs breeding migration from lakes and rivers of the valley to the adjoining tributaries to find suitable places, mainly side streams, nullahs or a side channels along the main river bed (Jhingran 1991, Welcomme 1985 and Sunder 1997). They prefer comparatively shallow waters with moderate currents and require a bed of sand, debris, fine pebbles and gravel. It breeds at a temperature ranging from 15°C to 20°C. The other requirement for spawning appears to be snow and glacial melt from the surrounding mountain ranges during spring. Breeding is performed once a year depending upon the water temperature and suitable breeding grounds (Sunder, 1997). The developing eggs and larvae of this snow trout are seen in semi stagnant nursery beds along riverbanks interspaced with gravel and stones. It spawns twice per year in this watershed: once in March-April and again in September –October. Sexually mature specimens spawn naturally when they reach 18-24 cm length. They attach eggs to the substrate. Fry stay on sand and gravel bottom. It spawns naturally in clear water on gravelly/stony grounds or on fine pebbles at 1-3 m depth (Shrestha and Khanna, 1976). Water current of 2.8-4 m/sec, pH 7.5, dissolved oxygen concentrations of 10-15 mg/L, and gravel size of 50-80 mm are the optimal conditions for spawning (Shrestha and Khanna, 1976). Habitat and ecological parameters of *Schizothorax plagiostomus* are described in table below.

Adult Juveniles Spawning Depth Deep (> 0.75 m) Shallow (<0.75 m) Shallow side streams (<0.75 m) Velocity Medium to high (> 2 m/s) Slow (0-2 m/s) Slow (0-2 m/s) Habitat Pools, glides, riffles Pools Riffles, shallow pools Substrate Cobbles, stones Gravel Gravel Temperature 15-25°C 15-25°C 15 to 20°C Dissolved O_2 6-8 mg/l 6-8 mg/l 8-10 mg/l Food Omnivorous Omnivorous – Spawning period Twice per year, March-April and September–October Endemic No Movement Cue Move from main river to side channels for breeding. Pattern Moves from river to side streams and tributaries for suitable habitat Timings Night movements Triggers Snow melt, rise in turbidity, rise in water temperature, flow pattern, type of riverbed, availability and protection of breeding grounds, extent of swelling of river channels during flood season, back water pools, inundated areas, physical condition and flood pattern of tributary streams.

<u>Value</u>: Food, Sport, food for otters, important component of food chain, angling, importance in ecotourism

Habitat and Ecological Parameters of *Schizothorax plagiostomus* (Alwan Snow Trout)

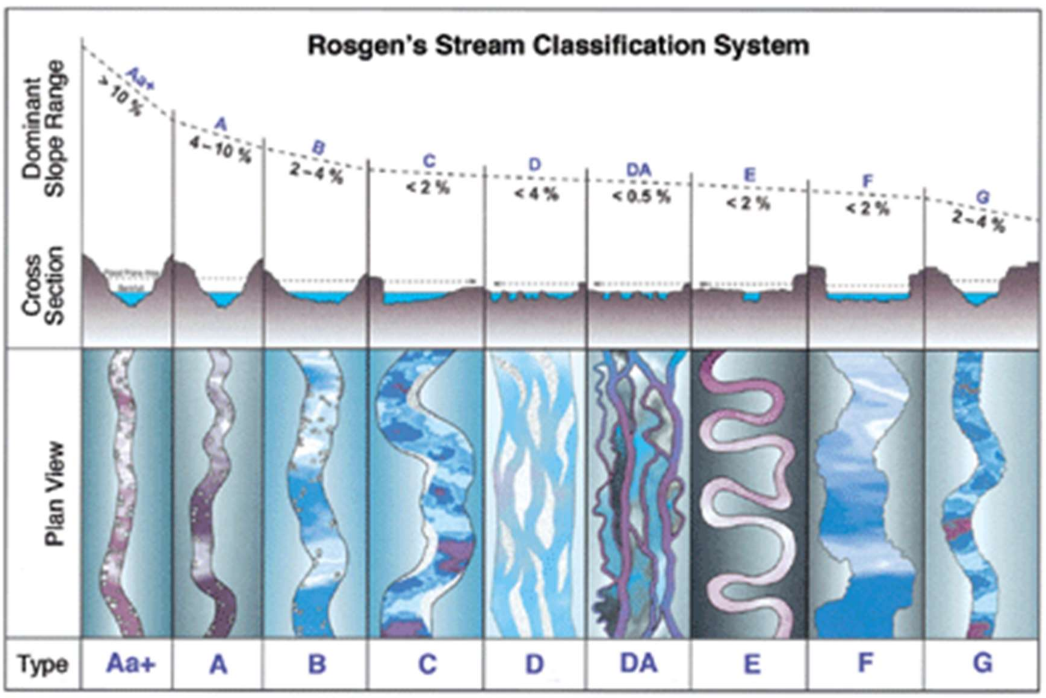
	Adult	*Juveniles*	*Spawning*
Depth	Deep (> 0.75 m)	Shallow to deep (<0.75 m)	Shallow (<0.75 m)
Velocity	High to medium (> 2 m/s)	Medium to Slow (0-2 m/s)	Slow (0-2 m/s)
Habitat	Rapids, Pools, Glides	Shoreline	Riffle
Substrate	Cobbles also Stony to gravely	Stony to gravely	Stony, Cobble
Temperature	10-18 °C	10-18 °C	12-15 °C
Dissolved O_2	6-8 mg/l	6-8 mg/l	10 mg/l
Food	Fish,invertebrates	Invertebrates	–
Spawning period	Early spring and autumn		
Endemic	No		
Movement Cue	Move from main river to tributaries for spawning		
Pattern	The Adult move to main river after spawning		
Timings	October November		
Triggers	Change in flow pattern, reduction in turbidity, fall or rise in water temperature		
Value	Food for humans and otters, sports fish, angling, importance in ecotourism		
Studies needed	Movement patterns, what causes them to move, how far do they move		

7.2.2 *Country group exercise: Designing a wide-scale EFlows Assessment*

1. Identify rivers important to the marine environment (Google Earth)
    a. Move so that view shows the coast line of you country
    b. Go back in time; select an image in the wet season
    c. Zoom in so you can see the rivers entering the ocean
    d. Start in S and move N, checking each river entering the ocean
    e. Where you can see a plume of sediment entering the ocean from the rivers, mark the river using a pointer in Google and label it with river name
    f. Mark all rivers with major plumes – using several images from several years
2. Select a study area
    a. Zoom out on Google area and check for marine areas supported by one river or groups of rivers
    b. Demarcate these areas
    c. Select one area
    d. Rank rivers in study area in terms of the relative amount of sediment provided to ocean
    e. For top two ranked systems – go to step 3
3. Select ecosystems for inclusion in EFA (Google Earth)
    a. ID different aquatic ecosystems (main river channel, tributaries, estuary, wetlands, floodplains, etc.)
    b. Mark location of these using GE polygons
4. Gather additional information for selected river(s) (Google Earth):
    a. Mark political boundaries
    b. Divide river channel on the basis of (mark divisions on GE):
        i. FEOW (https://www.feow.org)
        ii. channel planform (see Rosgen's Stream Classification)
    c. Delineate boundaries for estuary and marine system
    d. Map main settlements
    e. Identify main uses of the river
    f. Mark the location of the top three river uses
5. Select provisional EFlows sites/zones/areas
    a. Select six EFlows sites/zones/areas for detailed EF study
    b. For each – estimate Present Ecological State
6. Design future scenarios to be evaluated
    a. Pick top main uses
    b. Design two future scenarios that comprise a mix of three main uses :
        i. 2030
        ii. 2050
    c. Provide some indication of expected Climate Changes for the study area
    d. Make an additional two future scenarios: 2030CC; 2050CC
7. Identify partners in study

a. Other government organisation/cross sectoral corporation
b. Resource institutions – universities/consultants
c. Stakeholders

8. Identify key questions / issues to be addressed by EFA
    a. ID four main questions/concerns of key Stakeholders
    b. Identify other priorities that could be addressed through design of the SoW for an EFA
9. Select a method type or types suggested for use in the EFA.
10. ID baseline data that will be needed for EFA and potential sites for monitoring.



7.3 Workshop participants

No.	Country	Name
1.	Comoros	**Mrs. Chadhouliati Abdou Chakour** Director of Water and Sanitation E-mail: chadhouliati2010@yahoo.fr
2.	Kenya	**Mr. Reuben Ngessa** Asst. Technical Coordination Manager - Surface Water at the Water Resources Authority head office, Nairobi Email: reubenngessa@gmail.com

3.		**Mr. Samuel Gitonga** Chief Technical Services Manager Tana and Athi River Development Authority (TARDA) Queensway House, Kaunda Street P.O Box 47309 - 00100 Contact: +254721166686, Email: gitonga@tarda.co.ke
4.	Mauritius	**Mr Dharamraj Deenoo** Deputy Permanent Secretary, Ministry of Social Security, National Solidarity and Environment and Sustainable Development (Environment and Sustainable Development Division), Email: ddeenoo@govmu.org
5.		**Mr Lomush Juggoo** Director, Water Resource Management Authority Phone:4666503/4035400/52517866 E-mail: ljuggoo@govmu.org
6.	Mozambique	**Ms Arlete Lily Nomboro** National Directorate of Water Resources Management Ministério das Obras Públicas e Habitação Direcção Nacional de Águas Departamento de Recursos Hídricos E-mail: lnomboro@dnaguas.gov.mz/ alnomboro@yahoo.com.au
7.		**Ms Cristina Mahique** South Regional Water Administration (ARA-Sul) Email: mahiquecristina@gmail.com
8.	Madagascar	**Mr Ramarokoto Andriamifidiarivelo** Directeur Régional de l'Energie de l'Eau et des Hydrocarbures à Betsiboka. Department: Ministère de l'Energie, de l'Eau et des Hydrocarbures, (MEEH) Contact: +261 34 79 772 88 E-mail: phydiarivelorm@gmail.com
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