LARIMA - Overall project presentation

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MOZAMBIQUE
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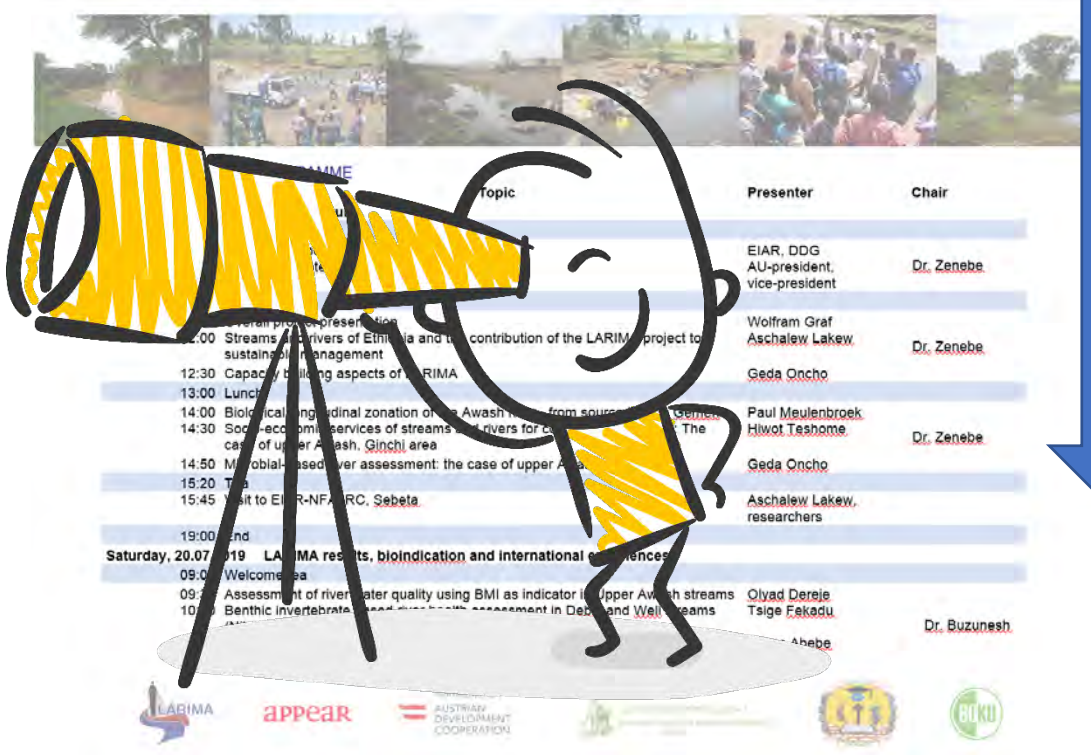
BOTSWANA
MADAGASCAR
SWAZILAND
LESOTHO
SOUTH AFRICA

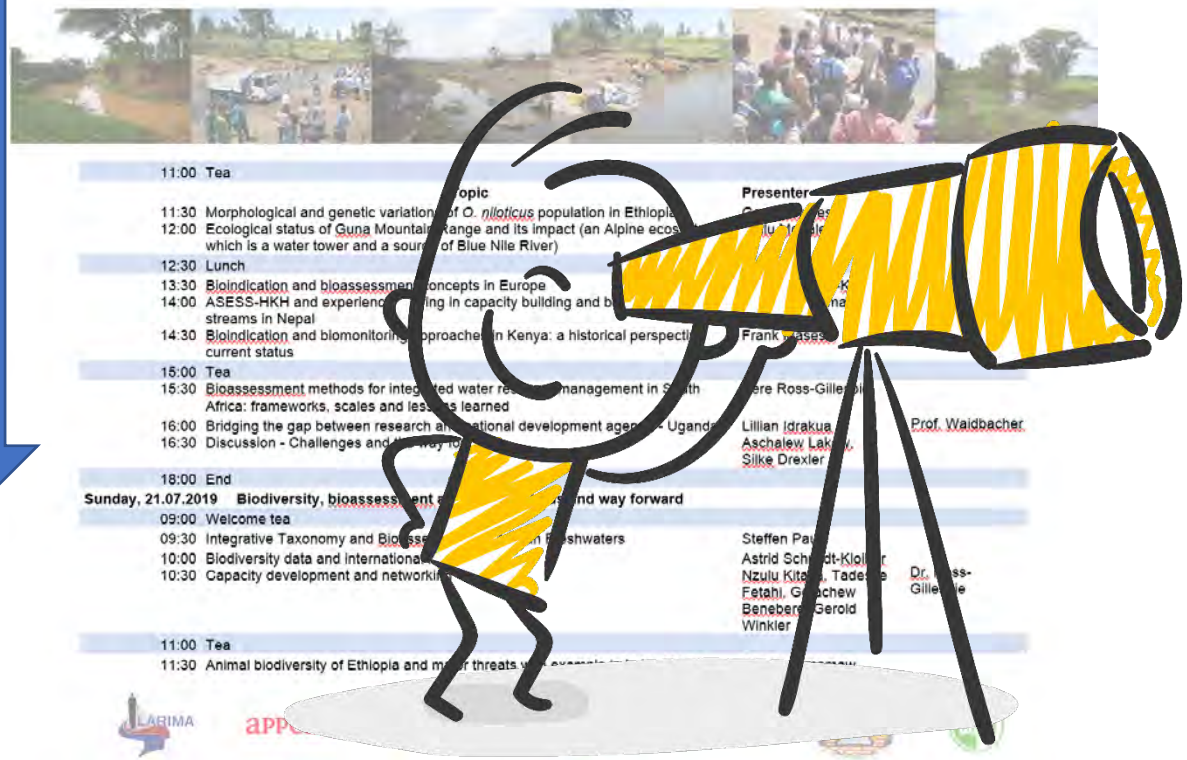
Structure of the conference

Look back



International expert input

Way forward



Sustainable Highland Rivers Management in Ethiopia- LARIMA

- Partners
- Ethiopian Institute of Agriculture Research at National Fishery and Aquatic Life Research Center (EIAR- NFALRC), Ethiopia
- Ambo University (AU
- University of Natural Resources & Life Sciences (BOKU), Department of Water, Atmosphere and Environment, Institute of Hydrobiology and Aquatic Ecosystem Management (IHG), Austria

- Financed by
- Austrian Development Cooperation
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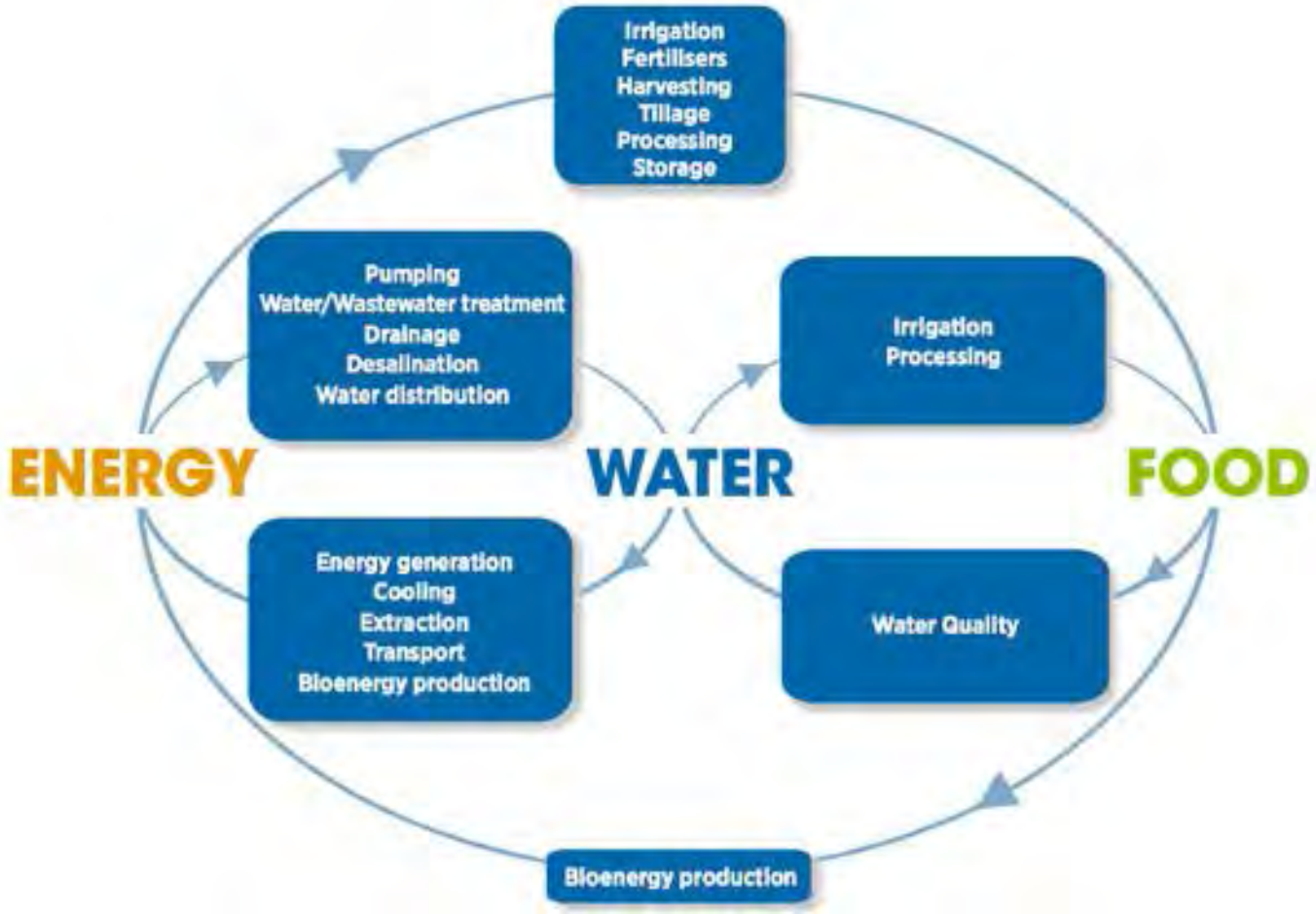
Sustainable Highland Rivers Management in Ethiopia- LARIMA



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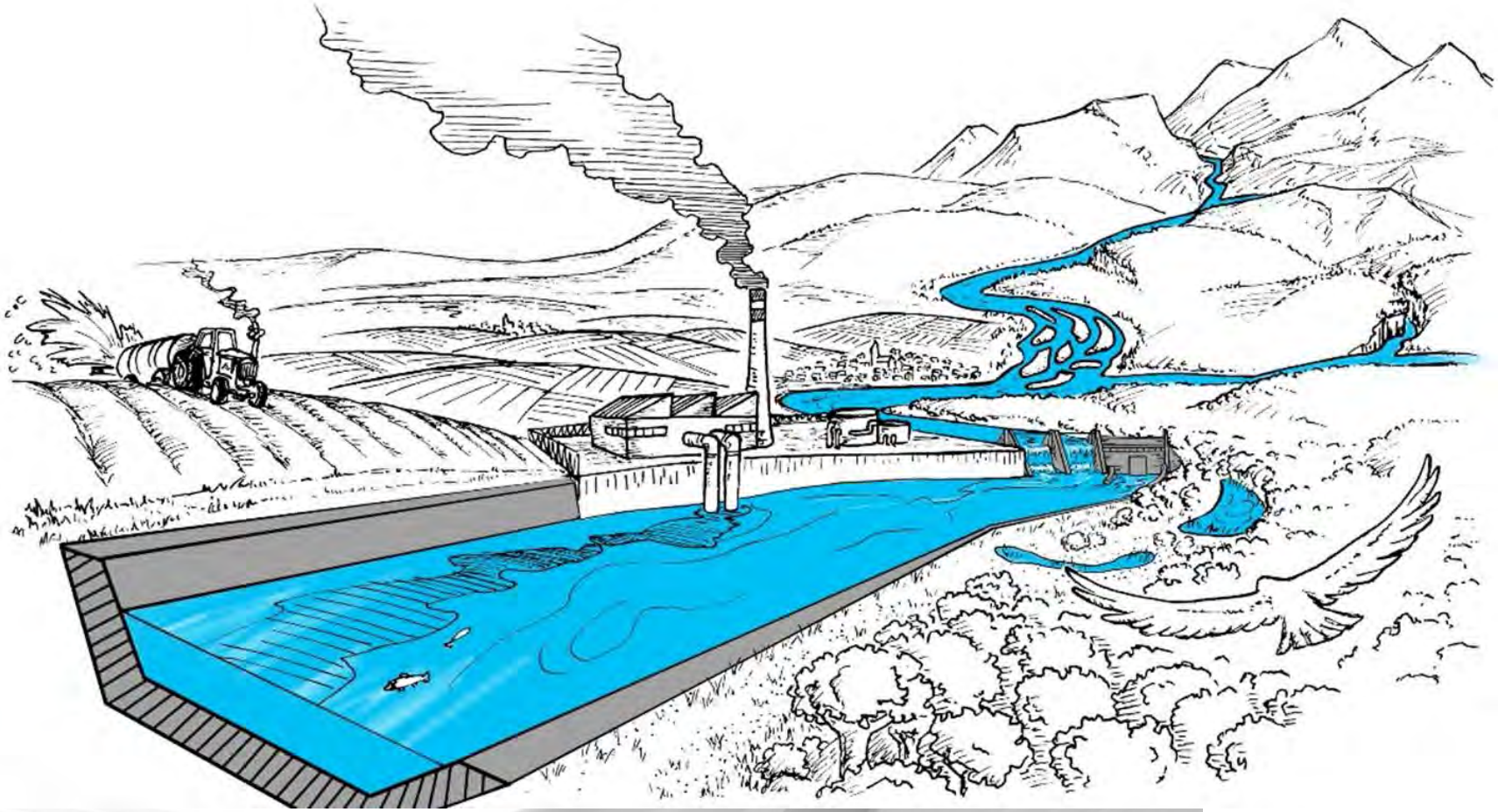
The river takes it all….



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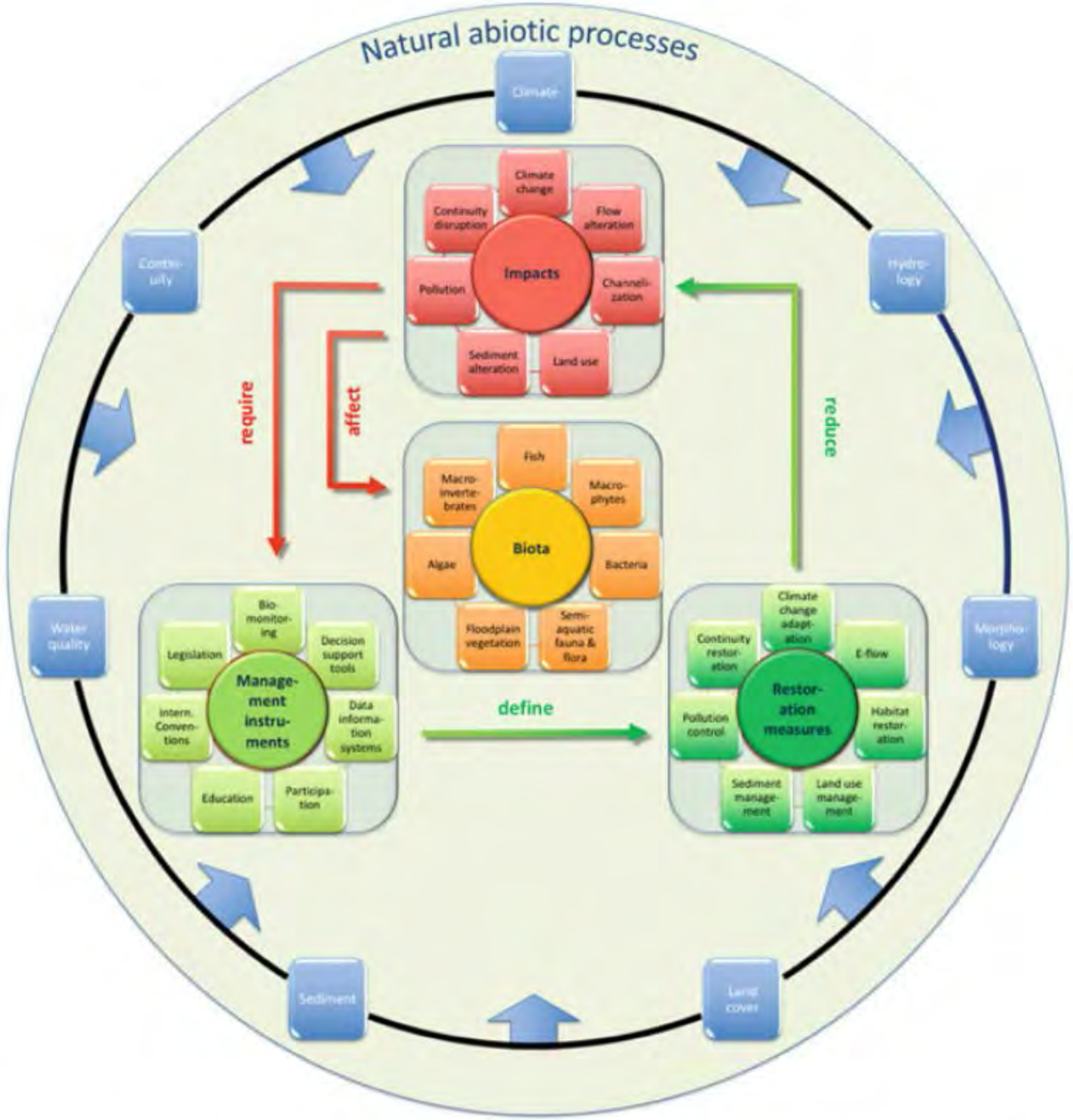

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WP1 Biomonitoring framework to assess the status of Ethiopian highland rivers

WP2 Watershed based case-study sites for education, training and capacity building on aquatic ecosystem management

WP3 Socio-economics and aquatic ecosystem services in Ethiopian highlands

WP4 Human & institutional capacity building for sustainable use of aquatic resources including curriculum enhancement

WP5 Dissemination framework

Scientific and administrative project management

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WP1

Biomonitoring framework to assess the status of Ethiopian highland rivers

Activity 1.1. Survey existing information and data for river basins in the central highlands (hydrology, land use, meteorology, physico-chemistry, morphology, biology data etc.).

Activity 1.2. Collect biodiversity data in highland streams and rivers of Ethiopia (focus on benthic macroinvertebrate, fish) based on data from literature, previous projects and study sites.

Activity 1.3. Develop/adapt a top-down operative stream classification system (typology).

Activity 1.4. Validate and adapt existing benthic macroinvertebrate river biomonitoring concepts for Ethiopian highland rivers with the results received in Activities 1.2 and 4.4.

Sustainable Highland Rivers Management in Ethiopia

DELIVERABLE 1.1

Metadata on existing information and data for river basins in the Ethiopian Central Highlands

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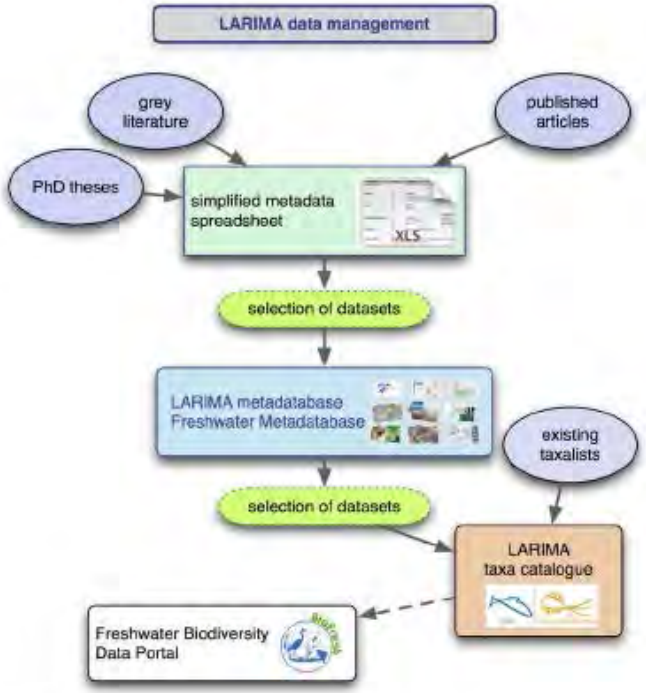
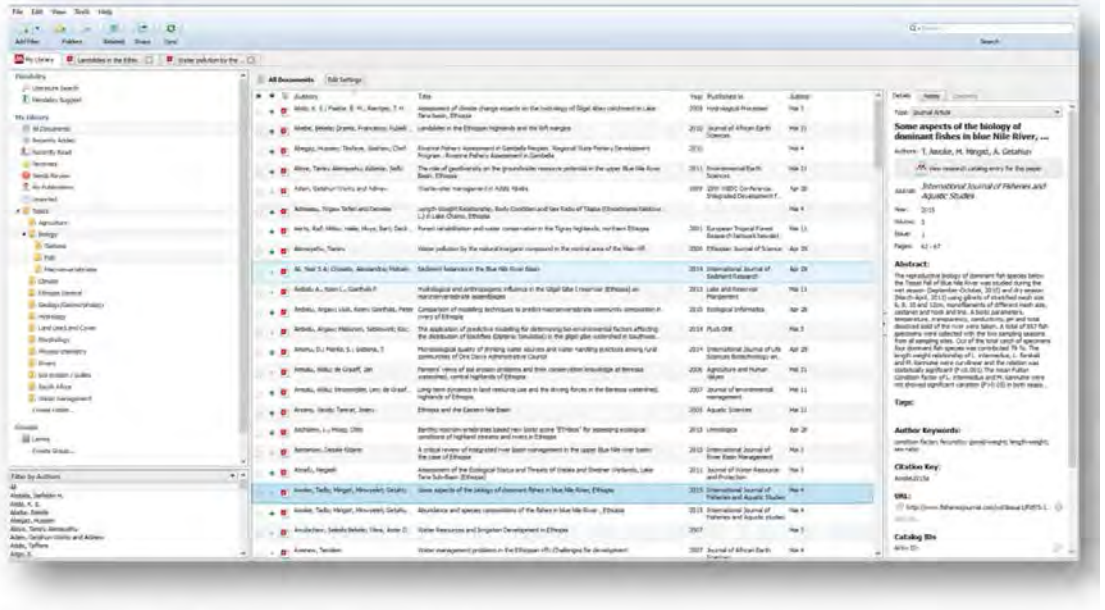


Figure 1: LAR

Data were stored in the Excel template (see above). Additionally, we created a Mendeley literature archive (see 3.1) that is available to all the LARIMA partners.



WP1

Biomonitoring framework to assess the status of Ethiopian highland rivers

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Activity 1.2. Collect biodiversity data in highland streams and rivers of Ethiopia (focus on benthic macroinvertebrate, fish) based on data from literature, previous projects and study sites.

→ Paul Meulenbroek: Biological longitudinal zonation of the Awash river – from source to lake Gemeri

Activity 1.3. Develop/adapt a top-down operative stream classification system (typology).

Activity 1.4. Validate and adapt existing benthic macroinvertebrate river biomonitoring concepts for Ethiopian highland rivers with the results received in Activities 1.2 and 4.4.

Biodiversity issues

- Ethiopia is outstanding in the afrotropical region
- Highland faunas and isolated mountain ranges
- High rate of endemism is expected

- What is known?
  - Scattered publication, no catalogue (of invertebrates)
  - Aim: complete check list of aquatic fauna: Fauna Aquatica Ethiopica

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Biodiversity issues

are prerequisites for

- Typology; based on distribution of selected organisms
- Bioassessment; based on taxonomical knowledge
- Conservation; based on 1) endemic species, 2) rare species, 3) faunal shifts due to anthropogenic pressure

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Example: Screening of literature

ON THE TRICHOPTERA OF ETHIOPIA

By D. E. KIMMINS

SYNOPSIS

A study of collections made by Dr. A. Tjønneland and others has resulted in raising the number of species recorded from Ethiopia to fifty-one, of which seventeen are here described as new. The genus *Hydropsychodes* Ulmer has been placed as a synonym of *Cheumatopsyche* Wallengren.

UNTIL Dr. A. Tjønneland began collecting with the aid of a mercury vapour light trap, the trichopteran fauna of Ethiopia was almost unknown. A selection of his catches, together with collections made by two of his colleagues and by Mr. Bob G. Hill in the Dire Dawa district, form the subject of this study. They have increased the number of species recorded to fifty-one, of which seventeen are here described as new.

Despite this considerable addition to the known fauna, much of the country is still unworked and it is probable that further representatives of families of Trichoptera which occur elsewhere in Africa remain to be discovered. These include the Rhyacophilidae, Philopotamidae, Polycentropodidae, Hydroptilidae, Calamoceratidae, Leptoceridae and Lepidostomatidae.

Of the species now known to occur in Ethiopia, eleven are found also in East Africa, seven extend into West Africa and five are widespread African species. One species was originally described from SW. Arabian material and another is closely allied to a species from that area.

The author wishes to express his thanks to Dr. A. Tjønneland, of University College of Addis Ababa, for the opportunity of working on this collection and for allowing the British Museum (Natural History) to retain most of it, including the holotypes and allotypes. Paratypes, where available, and named duplicates have been returned to the University College of Addis Ababa. Dr. Tjønneland has also made collections of Ephemeroptera in Ethiopia, which it is hoped to deal with in due course.

In the present paper, to save space, in recording localities the word ETHIOPIA has been omitted. In indicating the location of types and paratypes, the abbreviations (BMNH) and (UCAA) have been used for the British Museum (Natural History) and the University College of Addis Ababa respectively.

Family **PHILOPOTAMIDAE**

Chimarra abyssinica Banks

Chimarrha abyssinica Banks, 1913 : 235, (♀) ; Ulmer, 1930 : 479–482, figs. 1–3, (♂).

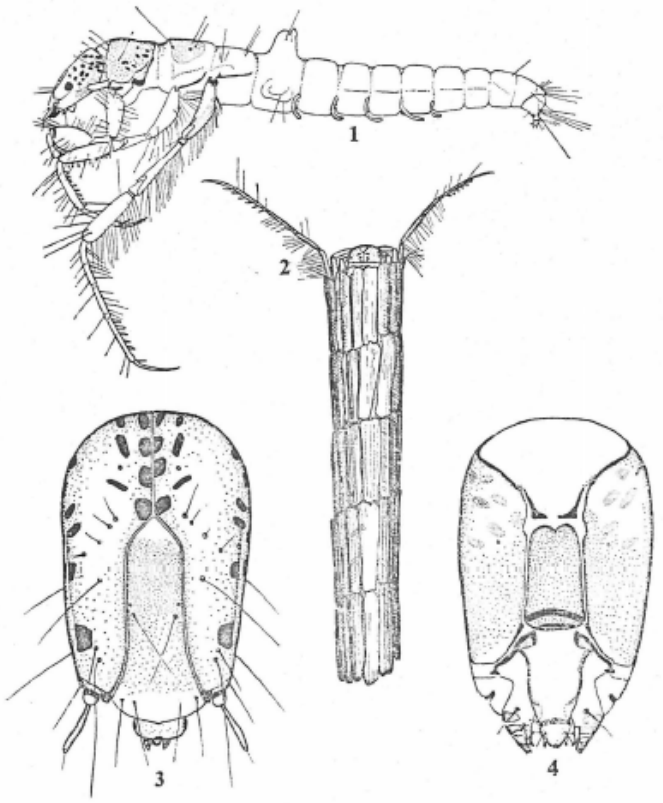
Gamo Province, Gughé Highlands, Bonghé, c. 9,000 ft., 29.xii.1948, from foliage of willows and flood refuse by stream in flat valley, 1 ♂, 1 ♀ ; Chencha, c. 8,900 ft.,

TRICHOPTERA FROM A KENYA HIGH ALTITUDE STREAM

By N. E. HICKIN

(*Felcourt Research Laboratories, East Grinstead, Sussex*)

A COLLECTION of trichopterous larvae was made on 6th and 7th October, 1956, from a small sub-alpine stream—the Kipkurere river—in the Timboroa forest reserve in Kenya. The collecting station, known locally as Austin's Bridge, was about five miles



FIGS. 1–4.—Larva of *Triaenodes hickini* : (1) lateral view ; (2) larva in case, from above ; (3) head, from above ; (4) head, from below.

BRAUERIA (Lunz am See, Austria) 42:31-35 (2015)

Einige neue afrikanische Köcherfliegen (Trichoptera)

Hans MALICKY & Wolfram GRAF

Abstract. Six new species from Ethiopia (in the genera *Hellyethira, Stactobia, Orthotrichia, Cheumatopsyche, Athripsodes, Oecetis*), one new species from Sudan (*Orthotrichia*) and one new species from Morocco (*Wormaldia*) are described and figured. A list of a collection from Ethiopia is added.

Häufige Abkürzungen: LA Lateralansicht, DA Dorsalansicht, VA Ventralansicht, VFL Vorderflügellänge, KA Kopulationsarmaturen, OA obere Anhänge, UA untere Anhänge

Aus einer neuen Ausbeute des Zweitautors aus Äthiopien sowie aus Marokko und dem Sudan werden neue Arten beschrieben. Eine Liste des gesammelten äthiopischen Materials wird angefügt. Die Holotypen und einige weitere Belegstücke befinden sich in der Sammlung des Erstautors, das andere Material in der Sammlung des Zweitautors. Die Namen der neuen Arten sind nach der Liste der Engel von Umberto Eco.

Die Details der äthiopischen Fundorte sind wie folgt:

Chancho River N von Chancho, 9°20'N, 38°45'E, 2500m, 30.10.2013, leg. W.Graf

Keta River N von Sululta, 9°12'N, 38°45'E, 2570m, 31.10.2013, leg. W.Graf

Kleiner Waldbach N von Addis Abeba, 9°05'N, 38°43'E, 2800m, 1.11.2013, leg. W.Graf

***Hellyethira marioch* n.sp. (Hydroptilidae)**

Hellbraun, Beine und Unterseite des Abdomens gelblich, Spornformel 034, Ocellen vorhanden. VFL 3,5 – 4 mm. ♂ KA (Seite 32): 9. Segment in LA fast kreisrund, mit einer vorspringenden dorsokaudalen Ecke. Das 10. Segment ist in DA länglich trapezförmig. Neben ihm entspringt ein Paar nach hinten und unten gebogener stumpfer Arme. UA in LA oval mit konkaver Ventralkante und mehreren großen, nach unten und innen gerichteten Borsten, von denen eine besonders lang ist; in VA sind sie basal breit, rasch nach außen verschmälert und dort annähernd löffelförmig nach hinten gerichtet. Wir sind nicht sicher, ob diese Art tatsächlich zu *Hellyethira* gehört, da sie von allen uns bekannten Arten abweicht. Sie sei einstweilen hierher gestellt.
Holotypus ♂ und 1♂ Paratypus, dazu ein vermutlich dazugehöriges ♀: Äthiopien, Kleiner Waldbach N von Addis Abeba, 1.11.2013, leg. W. Graf.

***Stactobia ruthiel n.sp.* (Hydroptilidae)**

Originalfärbung nicht mehr erkennbar. VFL 2 mm. Spornformel 124, aber der Tibiensporn ist winzig und kaum erkennbar. Ocellen vorhanden. ♂ KA (p. 32): Das 9.Segment hat einen mäßig langen vorderen Vorsprung der Ventralkante; dorsal trägt es ein Paar spitzer, leicht nach innen geneigter Stäbe. Der Ventralteil hat ein Paar großer, nach unten und innen gebogenen breiten Haken und ventral davon eine breite paarige Struktur, die in LA einfach und spitz erscheint. Der PA hat ein Paar nach unten und außen gewendeter Krallen.
Holotypus ♂: Äthiopien, Kleiner Waldbach N von Addis Abeba, 1.11.2013, leg. W. Graf.

***Orthotrichia thariel* n.sp. (Hydroptilidae)**

Braun, VFL 3 mm. ♂ KA (p. 33): Wie bei den meisten Orthotrichia-Arten ist es unmöglich, eine genaue Beschreibung in Worten zu geben; man muß die Abbildungen vergleichen. In DA sieht man links einen großen, im Bogen abstehenden, nach hinten gerichteten Arm, dorsal in der Mitte einen fast geraden Finger und distal eine längliche Platte, die spitz nach rechts gerichtet ist. Ventral sieht man zwei krumme Vorsprünge, die möglicherweise die UA sind. Der Innendorn ist mäßig lang, schlank, leicht gewellt und spitz.
Material: Sudan, Wadi Halfa, 26.-31.1.1962, leg. Kasy: 1♂.

***Orthotrichia gudiel* n.sp.**

Ganz hellbraun, VFL 3 – 3,5 mm. ♂ KA (p. 33): Ebenfalls nicht exakt mit Worten beschreibbar. Bei dieser Art ist der Ventralkomplex. an dem oft noch die UA zu erkennen sind, zu einem unförmigen länglichen Gebilde verformt. In LA sieht man ventral einen auffallend langen Fortsatz, der in VA als schlanker, spitzer Finger erscheint. Der Innendorn hat eine kleine basale Knolle und ist lang, schlank, gerade und spitz.
Holotypus ♂ und 2♂ Paratypen: Äthiopien, Kleiner Waldbach N von Addis Abeba, 1.11.2013, leg. W. Graf.

***Wormaldia asmodel* n.sp. (Philopotamidae)**

Hellbraun, Gabel 4 im Vorderflügel fehlt. VFL ♂ 5 – 6,5 mm, ♀ 5,5 – 7 mm. ♂ KA (p. 33): Eine durchaus „normal" aussehende Wormaldia, die sehr ähnlich ist wie *W. mediana* MCLACHLAN 1878 oder *W. triangulifera* MCLACHLAN 1878 und von diesen äußerlich kaum zu unterscheiden. Im Phallus gibt es aber fünf kurze, gerade, kräftige Dornen; bei *W. mediana* gibt es aber mehrere Paare verschieden langer Dornen, und für *W. triangulifera* ist ein gekrümmtes Bündel dünner Dornen charakteristisch (MALICKY 2004:85, 87)
Holotypus ♂ und mehrere Paratypen ♂, ♀: Marokko, Mittlerer Atlas, SW Tazzeka, Oued el Abod tributary, Bab Taka Paß, 1500-1700m, 6.6.2013, leg. G. Vinçon: 11♂, 7♀.

***Cheumatopsyche themaz* n.sp.**

Körper und Flügel graubraun, Beine, Palpen und Antennen hellbraun. VFL 8,5 – 9 mm. ♂ KA (p. 34): 9. Segment in LA mit konvexem Vorder- und konkaver Hinterkante, letztere mit einem bauchigen Vorsprung in der Ventralhälfte. Das 10. Segment ist ungewöhnlich gebaut, und wir kennen keine ähnliche Art: in DA ist es trapezförmig mit einem halbrunden behaarten Höcker (die sonst üblichen paarigen behaarten Warzen fehlen), in LA hat es drei eckige Vorsprünge (siehe Abbildung). Das erste Glied der UA ist relativ dick, das zweite Glied ist dünn und nach oben gebogen, etwa ¼ so lang wie das erste. PA sowohl in LA als auch in VA in der Basalhälfte auffallend bauchig.
Holotypus ♂ und 2♂ Paratypen: Äthiopien, Kleiner Waldbach N von Addis Abeba, 1.11.2013, leg. W.Graf.

***Cheumatopsyche plutonis* Banks 1913 (?)**

Hier (p. 34) bilden wir eine Art aus der äthiopischen Ausbeute ab, die nach den Abbildungen von ULMER (1930) *C. plutonis* sein könnte; die Abbildung von BANKS (1913) ist unkenntlich. Eine Untersuchung des Holotypus wäre erwünscht.

ZooKeys 766: 63–77 (2018)
doi: 10.3897/zookeys.766.24544
http://zookeys.pensoft.net

RESEARCH ARTICLE

ZooKeys
Launched to accelerate biodiversity research

Description of the larva of *Oecetis mizrain* Malicky & Graf, 2012 (Trichoptera, Leptoceridae) and *Lepidostoma scotti* (Ulmer, 1930) (Trichoptera, Lepidostomatidae) from Chilimo Forest, Central Ethiopia

Yonas Terefe[1,2], Simon Vitecek[3,4], Wolfram Graf[1]

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http://zoobank.org/3ABCCBB1-0C7B-4BE6-92DF-8E067C50E6AF

Citation: Terefe Y, Vitecek S, Graf W (2018) Description of the larva of *Oecetis mizrain* Malicky & Graf, 2012 (Trichoptera, Leptoceridae) and *Lepidostoma scotti* (Ulmer, 1930) (Trichoptera, Lepidostomatidae) from Chilimo Forest, Central Ethiopia. ZooKeys 766: 63–77. https://doi.org/10.3897/zookeys.766.24544

Abstract

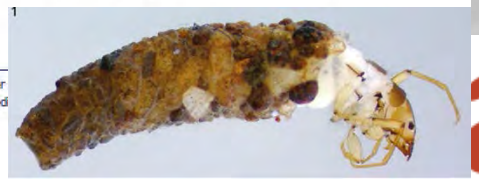
The Ethiopian caddisfly fauna comprises 85 species, including 10 *Oecetis* species and three *Lepidostoma* species. In this context we provide the first species-level descriptions of Ethiopian caddisfly larvae. We describe and illustrate the larvae of *O. mizrain* and *L. scotti*, with additional notes on their habitats and distribution.

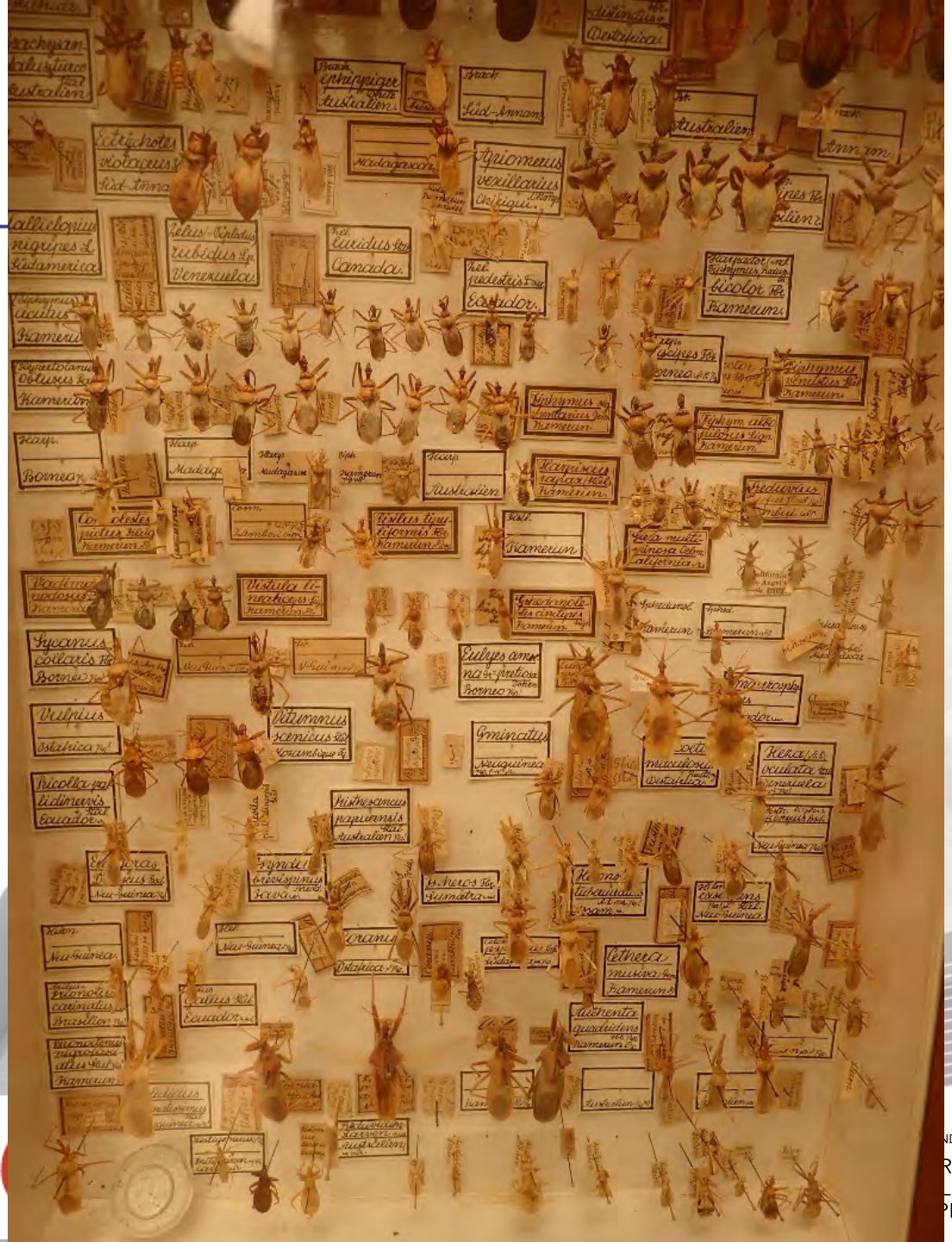
Keywords

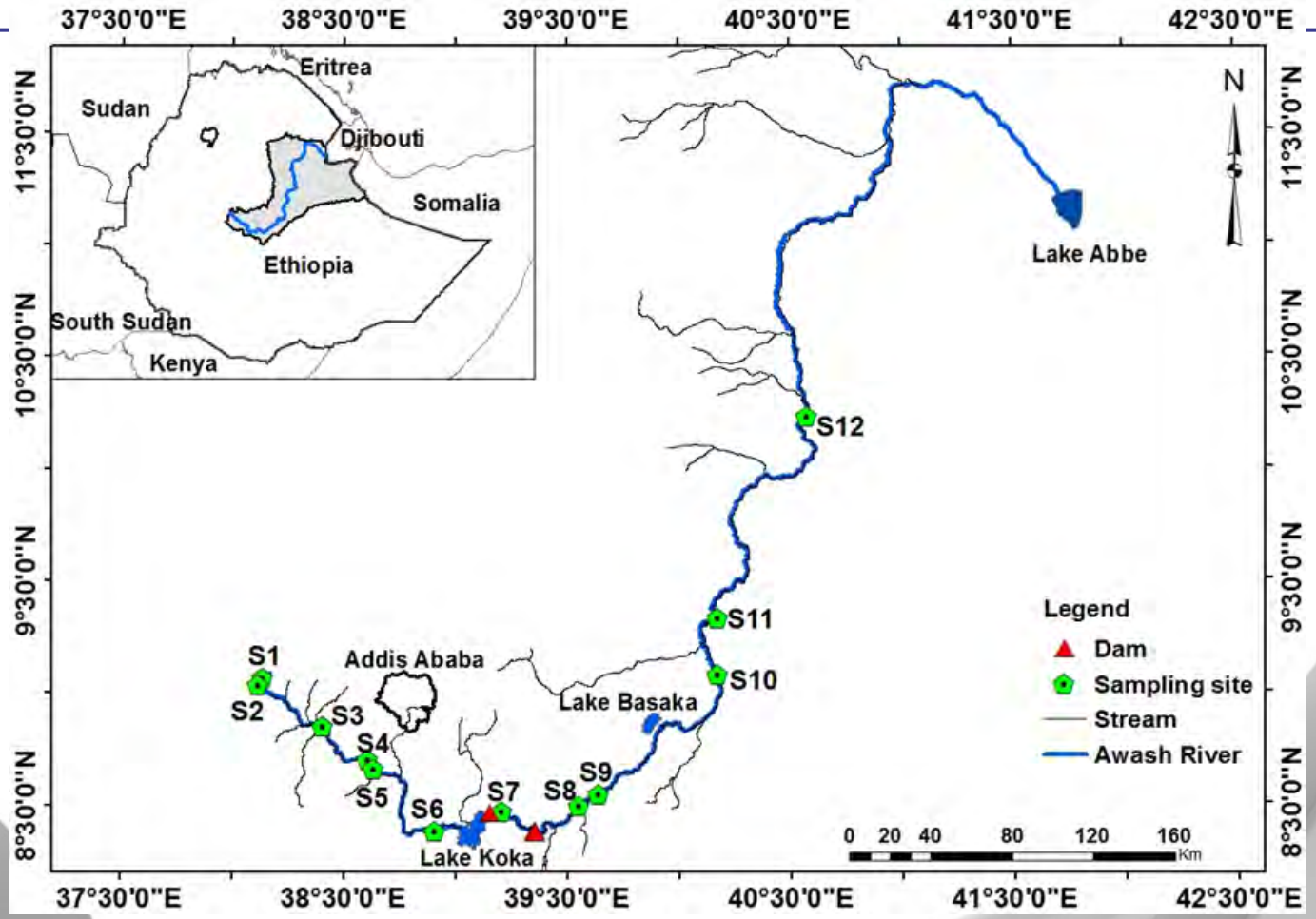
caddisfly larvae, distribution, ecology, Afrotropical Region, diversity, ecological management

Introduction

Caddisflies are one of the most diverse aquatic insect groups, distributed all over the world. The order Trichoptera comprises approximately 15,000 species (including 685 fossils) in 616 genera and 49 families (Morse 2017). The Oriental region

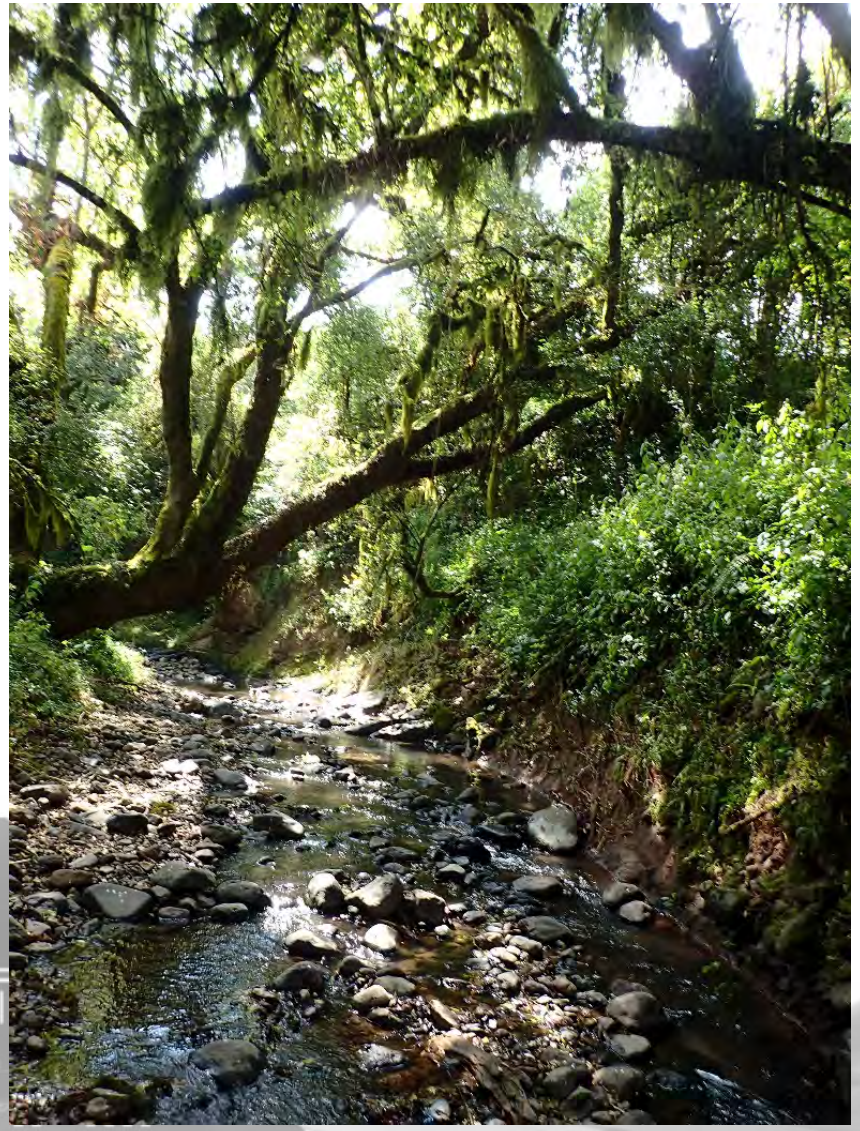






Site name Awash	Altitude (m a.s.l.)	Distance from source (km)	Ecoregion	Fish Zone
S1 - Chilimo forest	2389	5	Highland	Z1
S2 - Gare Arera	2244	15	Highland	Z1
S3 - Awash Belo	2065	76	Highland	Z1
S4 - Awash Kunture	2003	120	Highland	Z1
S5 - Sulula	1916	128	Highland	Z1
S6 - Lafessa	1608	201	Lowland	TZ1
S7 - Wonji	1552	254	Lowland	TZ1
S8 - Korkada	1260	324	Lowland	TZ1
S9 - Yimre	797	464	Lowland	TZ1
S1- - Worer	743	528	Lowland	Z2
S11 - Kada Bada	570	763	Lowland	Z2
S12 - Kalle Alli	460	950	Lowland	Z2
S13 - Dubti	378	1080	Lowland	Z2
S14 - Asaita	362	1136	Lowland	Z2

Awash - Ginchi



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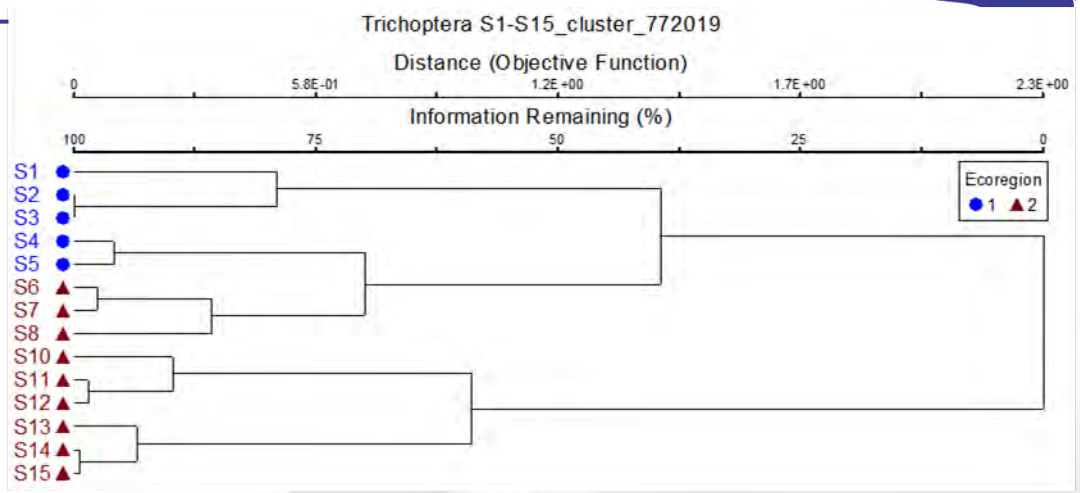
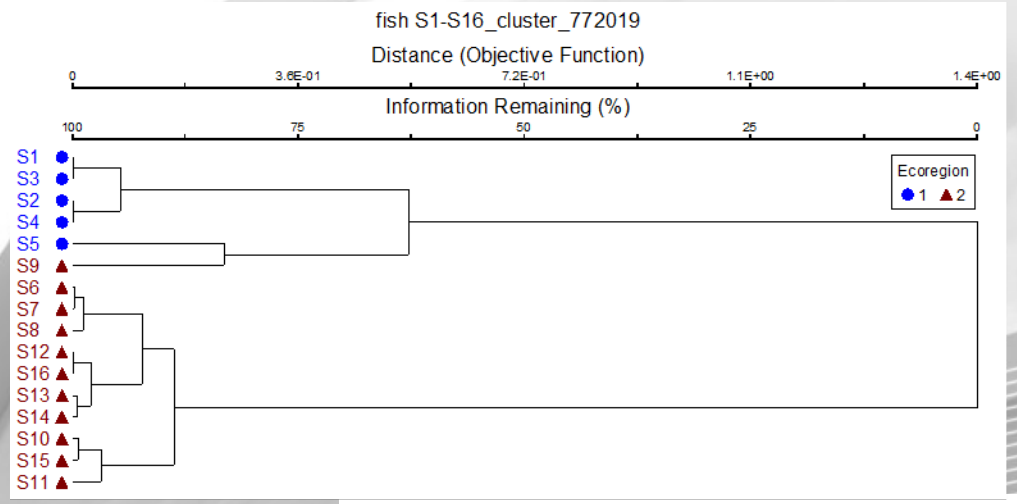
Awash - Lafessa





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WP1

Biomonitoring framework to assess the status of Ethiopian highland rivers

Activity 1.1. Survey existing information and data for river basins in the central highlands (hydrology, land use, meteorology, physico-chemistry, morphology, biology data etc.).

Activity 1.2. Collect biodiversity data in highland streams and rivers of Ethiopia (focus on benthic macroinvertebrate, fish) based on data from literature, previous projects and study sites.

Activity 1.3. Develop/adapt a top-down operative stream classification system (typology).

Activity 1.4. Validate and adapt existing benthic macroinvertebrate river biomonitoring concepts for Ethiopian highland rivers with the results received in Activities 1.2 and 4.4.

Sustainable Highland Rivers Management in Ethiopia

DELIVERABLE 1.3

Top-down operative stream classification system (typology) for Ethiopian highlands

appear
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LARIMA Activity 1.3.

Adjustment of a top-down operative stream classification system (typology)

Classification of Ethiopian highland streams and rivers

Aschalew Lekew, Otto Moog, Geda Kebede, Genanaw Tesfaye

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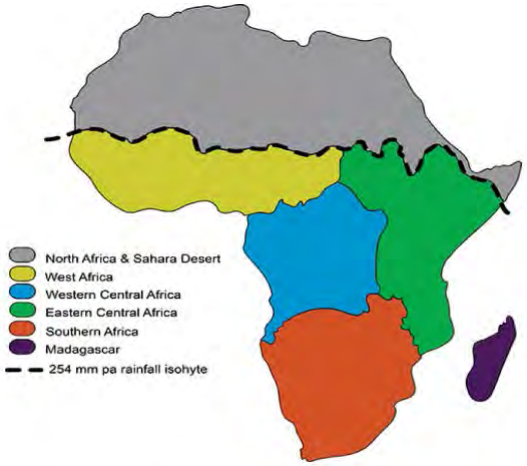


Figure 30: Sub-regions of Ethiopia in Africa

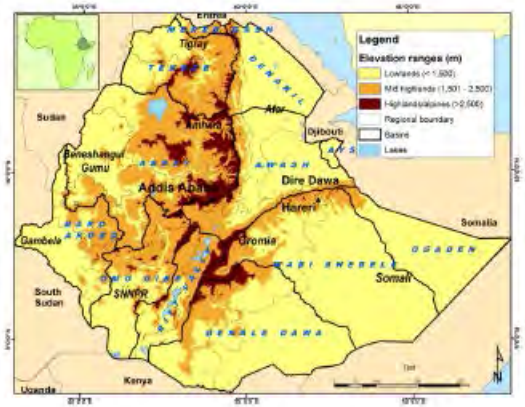


Figure 1: Distribution of Ethiopian highlands across 12 drainage basins

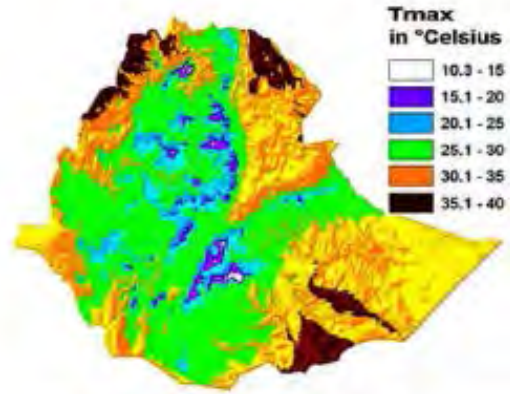


Figure 6; Mean annual temperature in Ethiopia

Figure 4: Drainage basins of Ethiopia

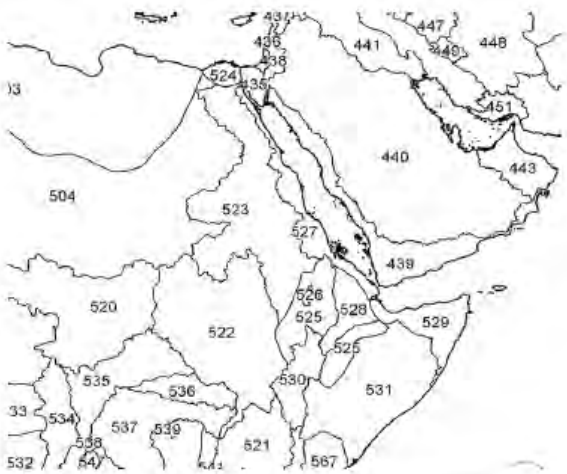


Figure 10: The map provided a detail of the FEOW regions that cover the area of Ethiopia

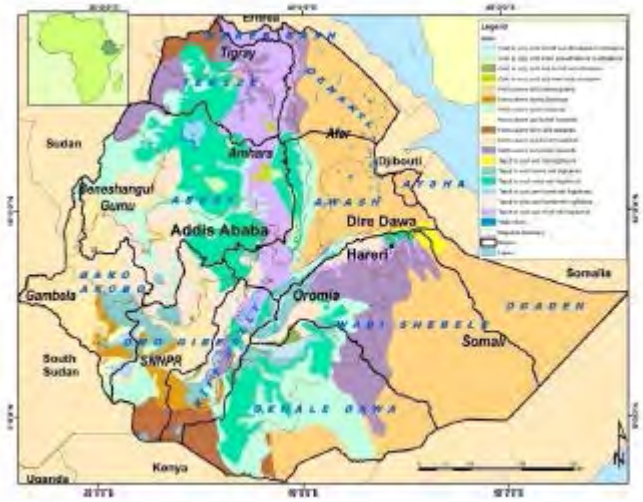


Figure 9: Agro-ecology of Ethiopia

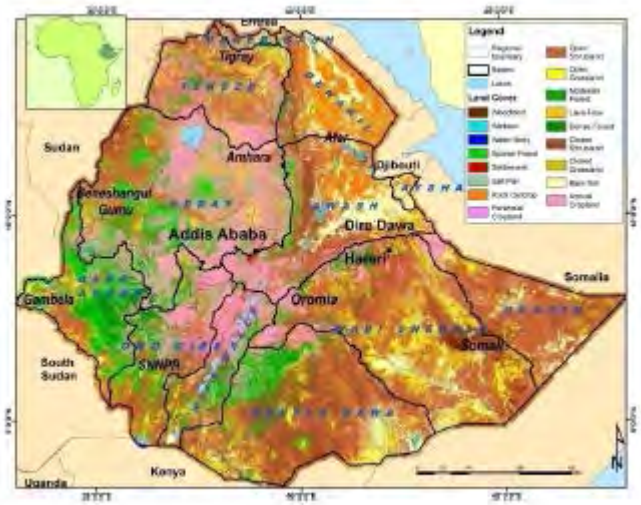


Figure 8: Land cover of Ethiopia

WP1

Biomonitoring framework to assess the status of Ethiopian highland rivers

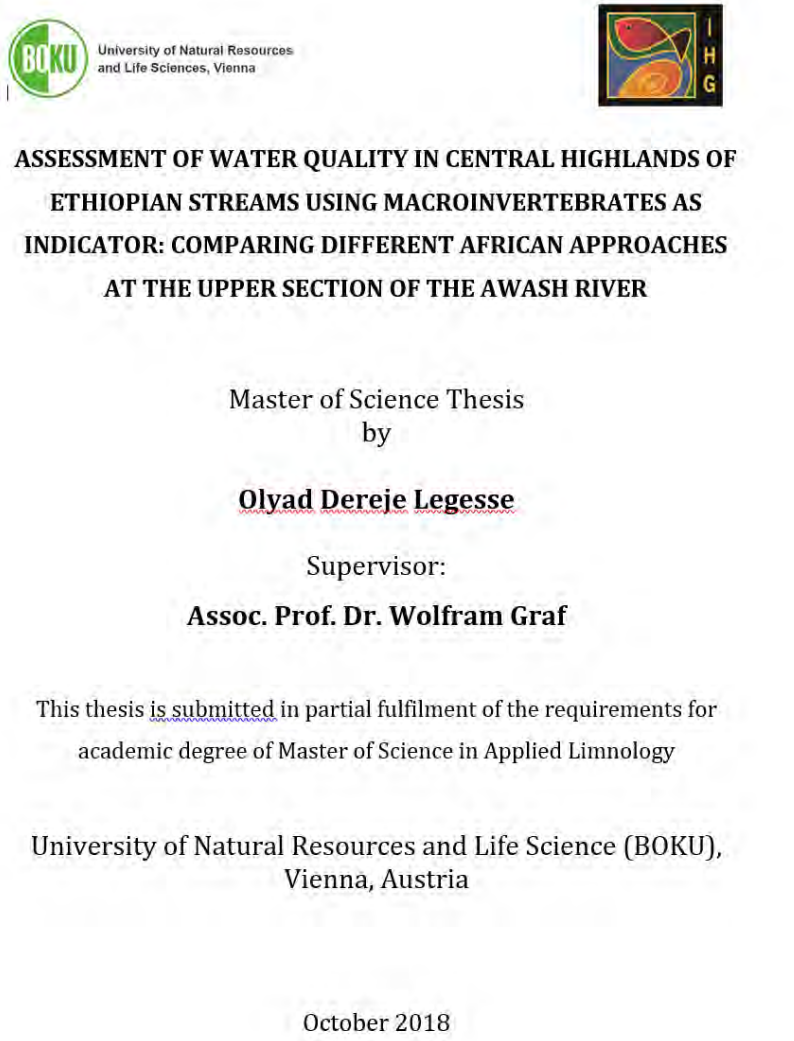
Activity 1.1. Survey existing information and data for river basins in the central highlands (hydrology, land use, meteorology, physico-chemistry, morphology, biology data etc.).

Activity 1.2. Collect biodiversity data in highland streams and rivers of Ethiopia (focus on benthic macroinvertebrate, fish) based on data from literature, previous projects and study sites.

Activity 1.3. Develop/adapt a top-down operative stream classification system (typology).

Activity 1.4. Validate and adapt existing benthic macroinvertebrate river biomonitoring concepts for Ethiopian highland rivers with the results received in Activities 1.2 and 4.4.

Activity 1.4. Validate and adapt existing benthic macroinvertebrate river biomonitoring concepts



University of Natural Resources and Life Sciences, Vienna

ASSESSMENT OF WATER QUALITY IN CENTRAL HIGHLANDS OF ETHIOPIAN STREAMS USING MACROINVERTEBRATES AS INDICATOR: COMPARING DIFFERENT AFRICAN APPROACHES AT THE UPPER SECTION OF THE AWASH RIVER

Master of Science Thesis
by

Olyad Dereje Legesse

Supervisor:

Assoc. Prof. Dr. Wolfram Graf

This thesis is submitted in partial fulfilment of the requirements for academic degree of Master of Science in Applied Limnology

University of Natural Resources and Life Science (BOKU), Vienna, Austria

October 2018

Site Code	No.of Taxa	SASS5 Score	No.of Taxa	TARISS Score	No.of Taxa	ETHbios Score
AW_1 Ref	19		19		16	
AW_2	17		17		14	
AW_3	16		16		13	
AW_4	13		13		11	
AW_5	23		23		20	
AW_6	24		24		21	
AW_7	23		23		19	
AW_8	27		27		22	
AW_9	24		24		20	
AW_10	17		17		15	
AW_11	19		19		16	
AW_12	16		16		13	
AW_13	15		15		12	
AW_14	9		9		7	

WP2

Watershed based case-study sites for education, training and capacity building on aquatic ecosystem management

Activity 2.1. Select two generic case-study sites (impaired and least impaired) representative for central Ethiopian highlands.

Activity 2.2. Analyse driving forces and pressures on the study sites. Evaluate impacts and suggest mitigation measures to restore the health of the aquatic ecosystem (based on outcomes of Activity 4.4) beyond the project's period.

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Sustainable Highland Rivers Management in Ethiopia

DELIVERABLE 2.1

Selection of Case Study Sites

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WP2

Watershed based case-study sites for education, training and capacity building on aquatic ecosystem management

Activity 2.1. Select two generic case-study sites (impaired and least impaired) representative for central Ethiopian highlands.

Activity 2.2. Analyse driving forces and pressures on the study sites. Evaluate impacts and suggest mitigation measures to restore the health of the aquatic ecosystem (based on outcomes of Activity 4.4) beyond the project's period.

Activity 2.2. Analyse driving forces and pressures on the study sites

ASSESSMENT OF DRIVERS, PRESSURES AND THEIR IMPACTS ON BIOTIC INTEGRITY AND COMMUNITY LIVELIHOOD ALONG UPPER AWASH RIVER, ETHIOPIA

Thesis Submitted to the Department of Biology

School of Graduate Studies

AMBO UNIVERSITY

In Partial Fulfillment of the Requirement for the Degree of

MASTER OF SCIENCE IN ENVIRONMENTAL SCIENCE

By:

EPHREM SISAY

Email: efremsisu@gmail.com

Main advisor: Alemayehu Negassa (Ph.D)

Co-advisor: Aschalew Lakew (Ph.D)

Co-advisor: Wagari shore (MA)

June, 2017

Ambo, Ethiopia

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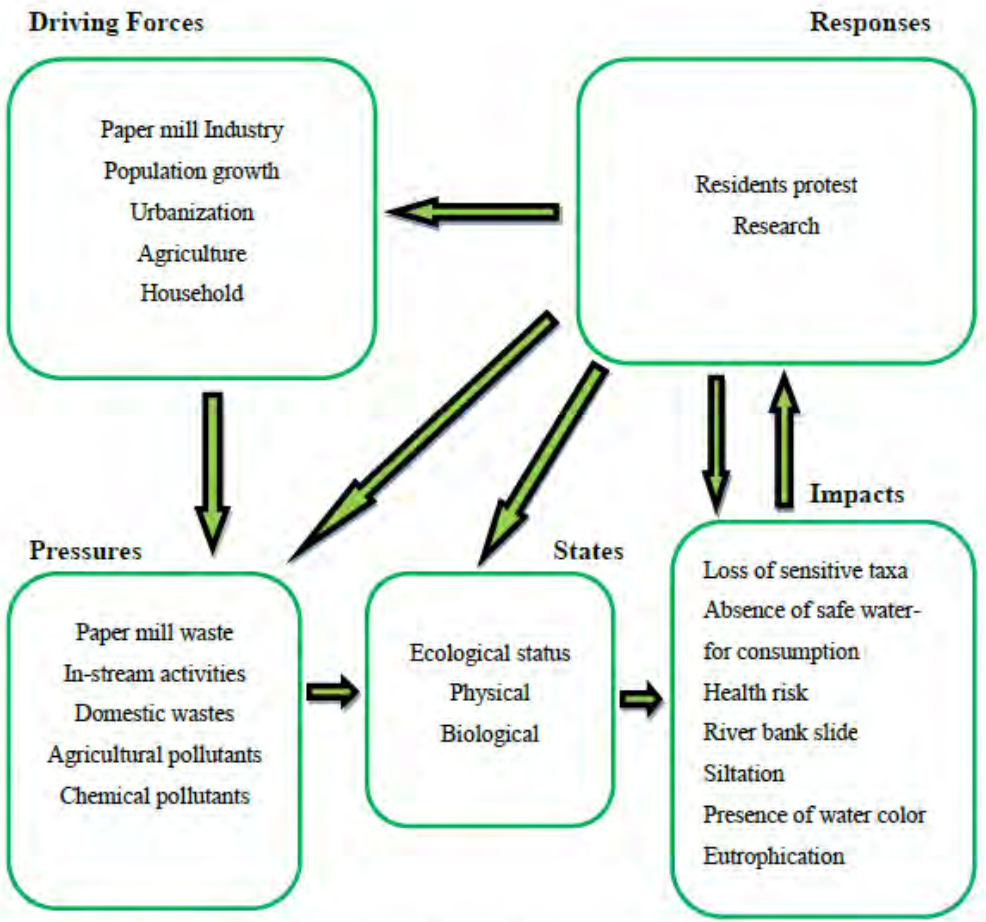

Figure 10: DPSIR model of upper Awash River in Ginchi study area.

WP3

Socio-economics and aquatic ecosystem services in Ethiopian highlands

Activity 3.1. Assess and analyse gender disaggregated aquatic ecosystem services over time.

Activity 3.2. Analyse socio-economic impacts of aquatic ecosystem management measures (introduced in WP5) on the livelihood of the community (e.g. hygienic aspects).

Hiwot Teshome:

Socio-economic services of streams and rivers for community livelihood: The case of upper Awash, Ginchi area



Sustainable Highland Rivers Management in Ethiopia

DELIVERABLE 3.1

Assessment and analysis of gender disaggregated aquatic ecosystem services over time

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AUSTRIAN DEVELOPMENT COOPERATION

Table 6. Respondent's perception on water quality across two case study sites

Factors for river water quality	Chilimo			Ginchi			
	Has no negative impact	No idea	Has negative impact	Has no negative impact	No idea	Has negative impact	X^2
Industrial influence	7	17	23	4	4	77	31.79***
Over grazing	4	1	42	3	2	80	6.225
Agricultural practices/irrigation…	2	2	43	3	1	81	1.793
Chemical residue from herbicide/pesticide	3	3	41	3	5	77	2.095
Chemical residue from fertilizer	2	0	45	7	31	47	6.112
Infrastructure expansion (e.g road. electricity…)	2	5	40	3	5	77	4.141
Open defecation /animal waste	32	3	12	5	4	76	16.194***
Clearing of forest	29	7	10	6	4	75	11.627***

*** Significant at the 0.01 level (2-tailed)

Table 7. Respondent's perception on water quality across sex of the respondents

Factors for river water quality	Male			Female			
	Has no negative impact	No idea	Has negative impact	Has no negative impact	No idea	Has negative impact	X^2
Industrial influence	8	14	89	3	7	11	1.482E***
Over grazing	6	1	104	1	2	18	8.529*
Agricultural practices/irrigation…	4	2	105	1	1	19	0.792
Chemical residue from herbicide/pesticide	1	5	105	1	7	13	0.353
Chemical residue from fertilizer	3	5	103	1	7	13	0.588
Infrastructure expansion (e.g road. electricity…)	4	10	97	1	-	20	4.660
Open defecation /animal waste	9	3	99	3	1	17	0.566
Clearing of forest	8	3	100	2	1	18	0.287

***, * Significant at the 0.01 level (2-tailed) and 0.1 level (2-tailed) respectivily

WP4

Human & institutional capacity building for sustainable use of aquatic resources including curriculum enhancement

Activity 4.1. Develop modules/course chapters in the field of surface water resources management for MSc curricula at Ambo University.

Activity 4.2. Develop short courses, including manuals, for practical training in aquatic ecology designed for research institutes, universities, agricultural and natural resources colleges and development organisations.

→ Aschalew Lakew: Streams and rivers of Ethiopia and the contribution of the LARIMA project to sustainable management

Activity 4.3. Organize expert exchange between partner institutions for lecturing and experience sharing. Develop a plan for further research activities and initiate future proposals based on the gap analysis and the project's results.

Activity 4.4. Offer research grants to 7 female and 3 male MSc graduate students enrolled in Ambo University in the area of surface water resources. Define research topics and supervise students.

→ Geda Oncho: Capacity building aspects of LARIMA

WP4

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WP5 Dissemination framework

Activity 5.1. Develop and maintain a project webpage including linking options to publish results on research networks, e.g. GBIF, BioFresh. Establish links with social media.

Activity 5.2. Prepare posters and leaflets in local languages (Oromiffa and Amharic) and organize sensitizing workshops including on-site demonstrations for local communities situated in the case-study watersheds (WP2) as well as interested stakeholders.

Activity 5.3. Final conference for international and national stakeholders, policy makers, officials, in-country universities and research institute representatives (including discussion of the future research plan).

WP5 Dissemination framework

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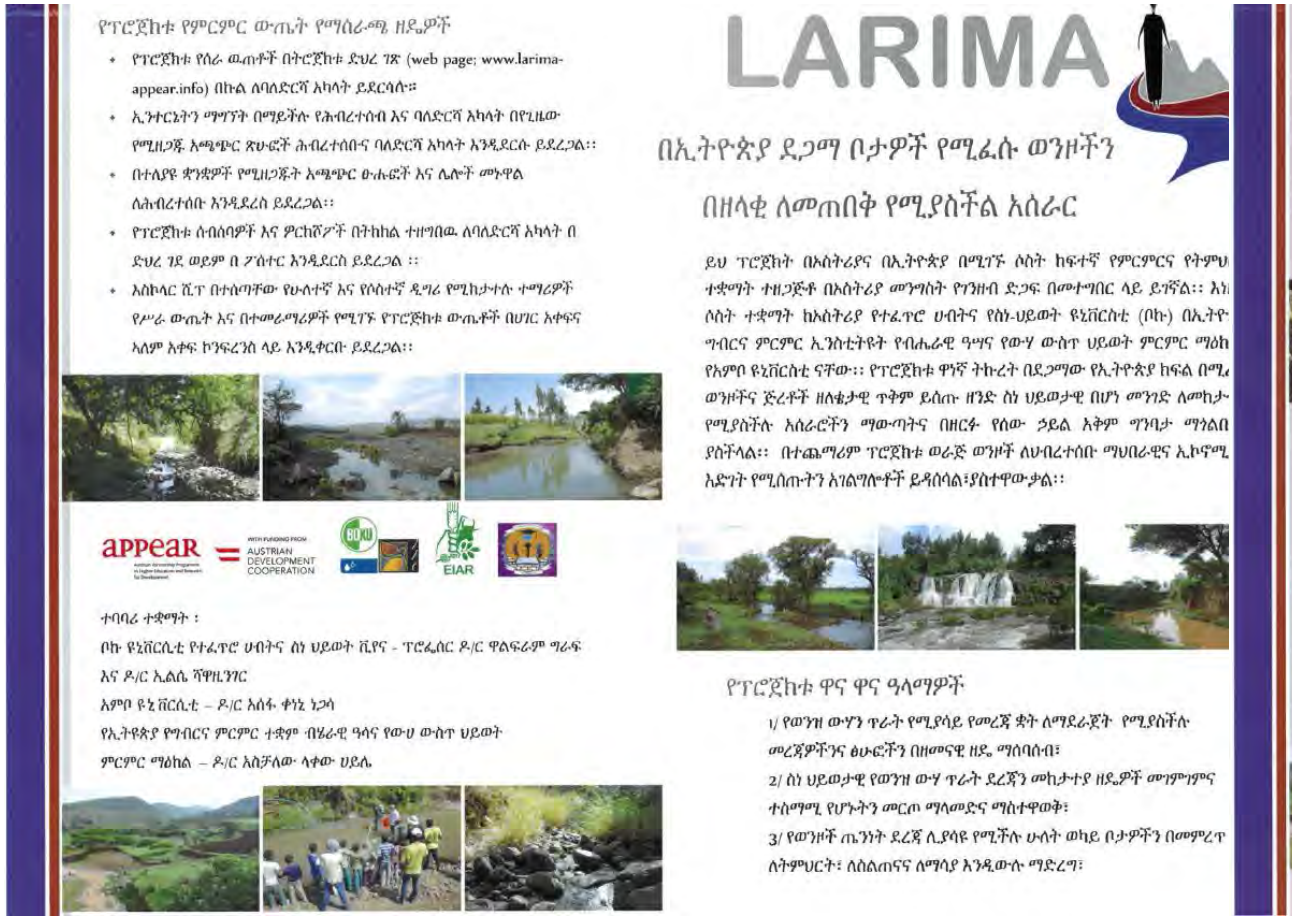

የፕሮጀክቱ የምርምር ውጤት የማሰራጫ ዘዴዎች

- የፕሮጀክቱ የሰራ ዉጠቶች በትሮጀክቱ ድህረ ገጽ (web page; www.larima-appear.info) በኩል ለባለድርሻ አካላት ይደርሳሉ።
- ኢንተርኔትን ማግኘት በማይችሉ የሕብረተሰብ እና ባለድርሻ አካላት በየጊዜው የሚዘጋጁ አጫጭር ጽሁፎች ሕብረተሰቡና ባለድርሻ አካላት እንዲደርሱ ይደረጋል፡፡
- በተለያዩ ቋንቋዎች የሚዘጋጁት አጫጭር ፅሑፎች እና ሌሎች መሳዋል ለሕብረተሰቡ እንዲደረስ ይደረጋል፡፡
- የፕሮጀክቱ ሰብሰባዎች እና ዎርክሾፖች በትክክል ተዘግበዉ ለባለድርሻ አካላት በ ድህረ ገጽ ወይም በ ፖስተር እንዲደርስ ይደረጋል ፡፡
- እስኩላር ሺፕ በተሰጣቸው የሁለተኛ እና የሶስተኛ ዲግሪ የሚከታተሉ ተማሪዎች የሥራ ውጤት እና በተመራማሪዎች የሚገኙ የፕሮጀክቱ ውጤቶች በሀገር አቀፍና ኣለም አቀፍ ኮንፍረንስ ላይ እንዲቀርቡ ይደረጋል፡፡

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ተባባሪ ተቋማት ፡

ቦኩ ዩኒቨርሲቲ የተፈጥሮ ሀብትና ስነ ህይወት ቪየና - ፕሮፌሰር ዶ/ር ዋልፍራም ሜራፍ እና ዶ/ር ኢልሴ ሻዋዚንገር

አምቦ ዩኒ ቨርሲቲ – ዶ/ር አሰፋ ቀነኒ ኑጋሳ

የኢትዮጵያ የግብርና ምርምር ተቋም ብሄራዊ ዓሳና የውሀ ውስጥ ህይወት ምርምር ማዕከል – ዶ/ር አስቻለው ላቀው ህይሉ

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በኢትዮጵያ ደጋማ ቦታዎች የሚፈሱ ወንዞችን በዘላቂ ለመጠበቅ የሚያስችል አሰራር

ይህ ፕሮጀክት በኦስትሪያና በኢትዮጵያ በሚገኙ ሶስት ከፍተኛ የምርምርና የትምህ ተቋማት ተዘጋጅቶ በኦስትሪያ መንግስት የገንዘብ ድጋፍ በመተግበር ላይ ይገኛል፡፡ እነ ሶስት ተቋማት ከኦስትሪያ የተፈጥሮ ሀብትና የስነ-ህይወት ዩኒቨርስቲ (ቦኩ) በኢትዮ ግብርና ምርምር ኢንስቲትዩት የብሔራዊ ዓሣና የውሃ ውስጥ ህይወት ምርምር ማዕከ የአምቦ ዩኒቨርስቲ ናቸው፡፡ የፕሮጀክቱ ዋነኛ ትኩረት በደጋማው የኢትዮጵያ ከፍል በሚ ወንዞችና ጅረቶች ዘለቄታዊ ጥቅም ይሰጡ ዘንድ ስነ ህይወታዊ በሆነ መንገድ ለመከታ የሚያስችሉ አሰራሮችን ማውጣትና በዘርፉ የሰው ኃይል አቅም ግንባታ ማጎልበ ያስችላል፡፡ በተጨማሪም ፕሮጀክቱ ወራጅ ወንዞች ለህብረተሰቡ ማህበራዊና ኢኮኖሚ እድገት የሚሰጡትን አገልግሎቶች ይዳሰሳል፣ያስተዋውቃል፡፡

የፕሮጀክቱ ዋና ዋና ዓላማዎች

1/ የወንዝ ውሃን ጥራት የሚያሳይ የመረጃ ቋት ለማደራጀት የሚያስችሉ መረጃዎችንና ፅሁፎችን በዘመናዊ ዘዴ ማሰባሰብ፤

2/ ስነ ህይወታዊ የወንዝ ውሃ ጥራት ደረጃን መከታተያ ዘዴዎች መገምገምና ተስማሚ የሆኑትን መርጦ ማላመድና ማስተዋወቅ፤

3/ የወንዞች ጤንነት ደረጃ ሊያሳዩ የሚችሉ ሁለት ወካይ ቦታዎችን በመምረጥ ለትምህርት፣ ለስልጠናና ለማሳያ እንዲውሉ ማድረግ፤

Malli friin pirojektii ittiin tamsa'u

- Toora interneetii (www.larima-appear.info)
- Barreeffama gaggabaabaa yeroodhaa yerootti faca'anitiin afaan nanoottiin qopheesuu
- Maanuwaaloonni leenjii qooda fudhatootaf karaa soofti-koppii fi waraqaadhaan ni raabsamu.
- Karaa workishoopp fi leenjii adda adda.
- Frii qoranoowwanii joornaalota biyyaaleessaa fi addunywaa irratti maxansiisuu dhaan.

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Dhabileen hojii kan qindessan

Yunivarsiitii Qabeenya Uumamaa fi Saayinsii Lubbu-Qabeeyyii, Viyeenaa – **Prof. Dr. Wolfraam Graaf** fi **Dr. Ilsee Schwarziinger**

Yunivarsitii Amboo – **Dr. Asaffa kananii Nagaasaa**

Dhaabbata Qorannoo Qonnaa Itoophiyaa (EIAR), Giddugala Biyyaaleessaa Qorannoo Qurxummii fi Lubbu-Qabeeyyii biroo bishaan keessaa – **Dr. Aschaalew Laaqoo Haayilee**

LARIMA

Laggeen Baddaa Itoophiyaa Ittifufiinsaan Kunuunsuu fi Fayyadamuu

Pirojeektiin Laggeen baddaa Itoophiyaa Ittifufiinsaan Kunuunsuu fi Fayyadamuu (LARIMA)n hariroo Itiyoophiyaa fi Ostriiyaa giddutti uumame yenna ta'u,kaayyoon isas dandeettii humna nama gama hordoffii qaama bishanii maloota to'anna amayyatiin ijaruu, tajaajila bishaanii irratti saalaa fi hawaas-dinagdee bu'uureffachuudhaan hubanna uumuu dha.

Projeektiin kun kaayoo armaan gadi kan qabu yoo ta'u uummatta hirmachisuudhan gagefamaa

- Ragaalee gurguddoo (metadata) wa'ee bishaanii, ittifayyadama lafaa, haala qilleensaa, albuudoota bishaan keessaa, lubbu-qabeeyyii bishaan keessaa funaananii akka hundi itti fayyadamutti kaa'uu fi xiinxaluu.
- waa'ee bishaan baddaa Itoophiyaa irraa maddanii italuuf, meeshaa qorannoo amma hojii irra jiran (biomonitoring tools) fayyadamuun sadarkaan qabiyyeen bishanii irra jiru Amaleessuu fi xinxaluu.
- Haala laggeen baddaa Itoophiyaa ittifufiinsaan eeguun fi fayyadamuu danda'amu irratti oddoowwan qorannoo fi leenjiif oolan lama sulula bishanii kessatti hundeessuu.

observing benthic macro invertbrate at Belo reference site

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23/07/2016


23/07/2016

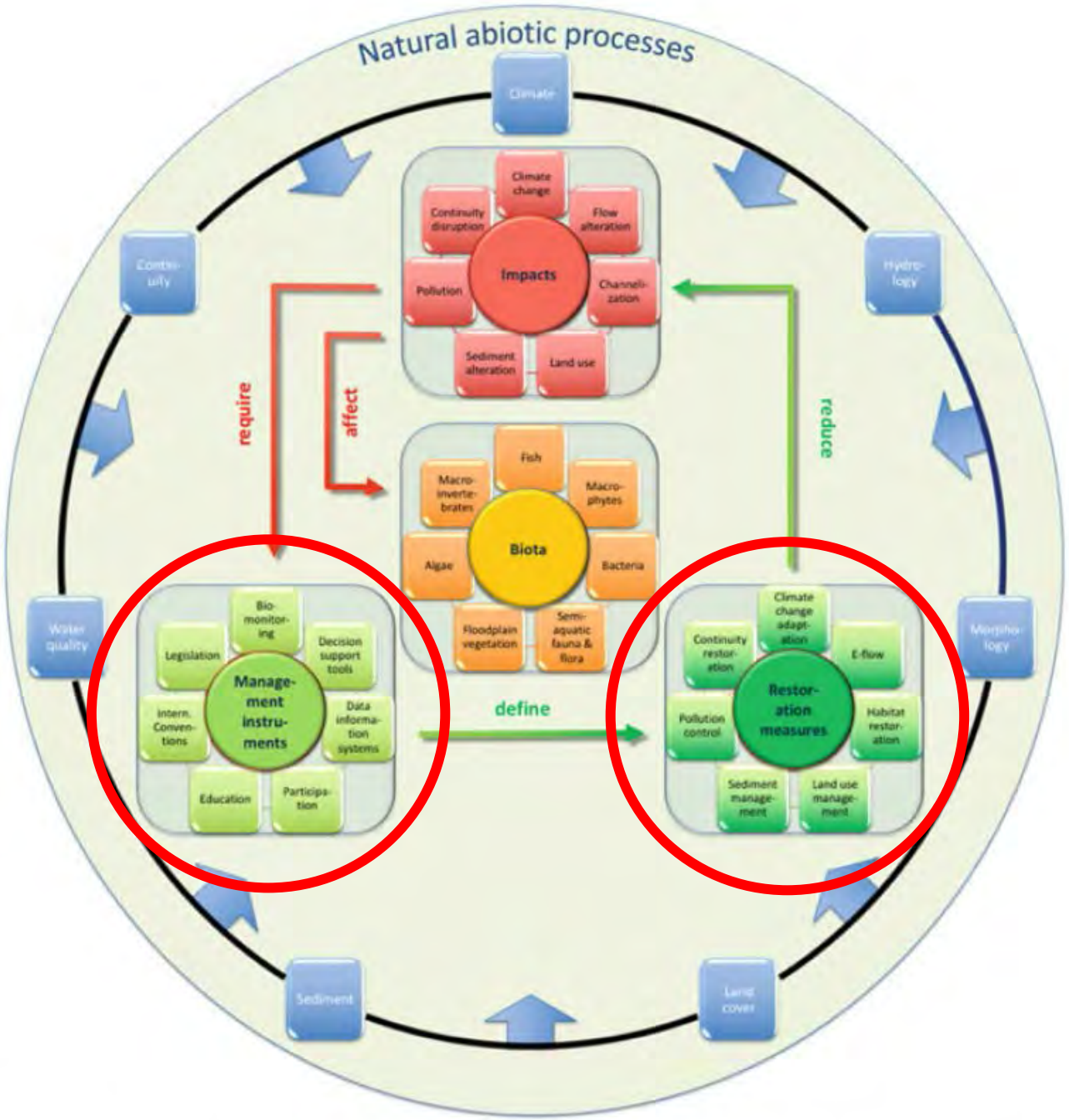
South-north partner meeting

WP5 Dissemination framework

Activity 5.1. Develop and maintain a project webpage including linking options to publish results on research networks, e.g. GBIF, BioFresh. Establish links with social media.

Activity 5.2. Prepare posters and leaflets in local languages (Oromiffa and Amharic) and organize sensitizing workshops including on-site demonstrations for local communities situated in the case-study watersheds (WP2) as well as interested stakeholders.

Activity 5.3. Final conference for international and national stakeholders, policy makers, officials, in-country universities and research institute representatives (including discussion of the future research plan).



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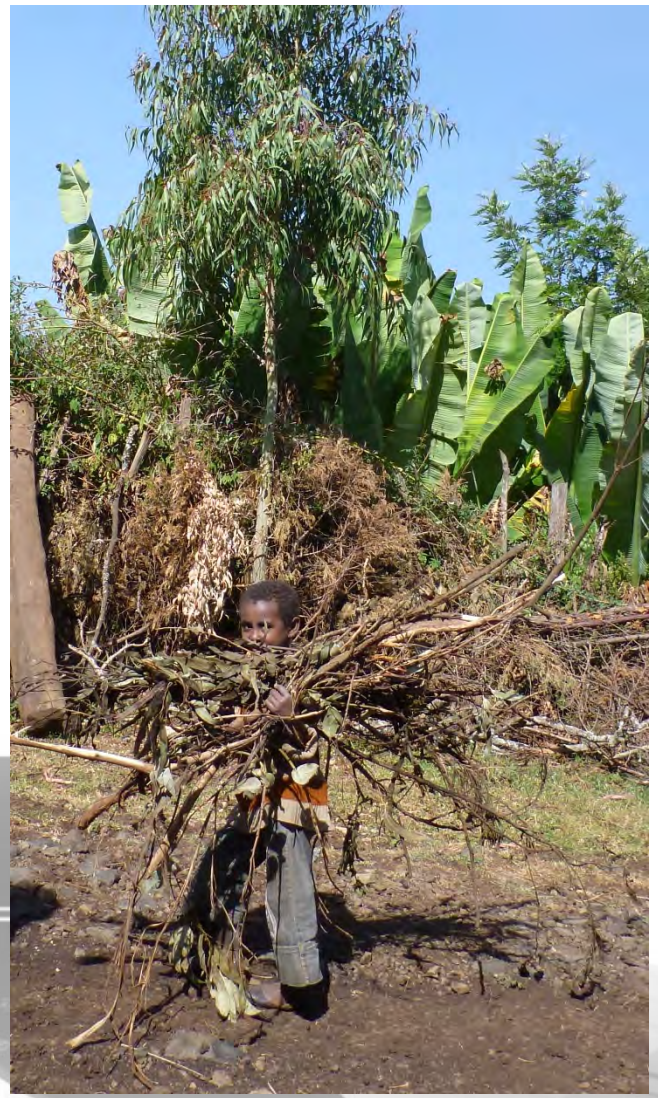
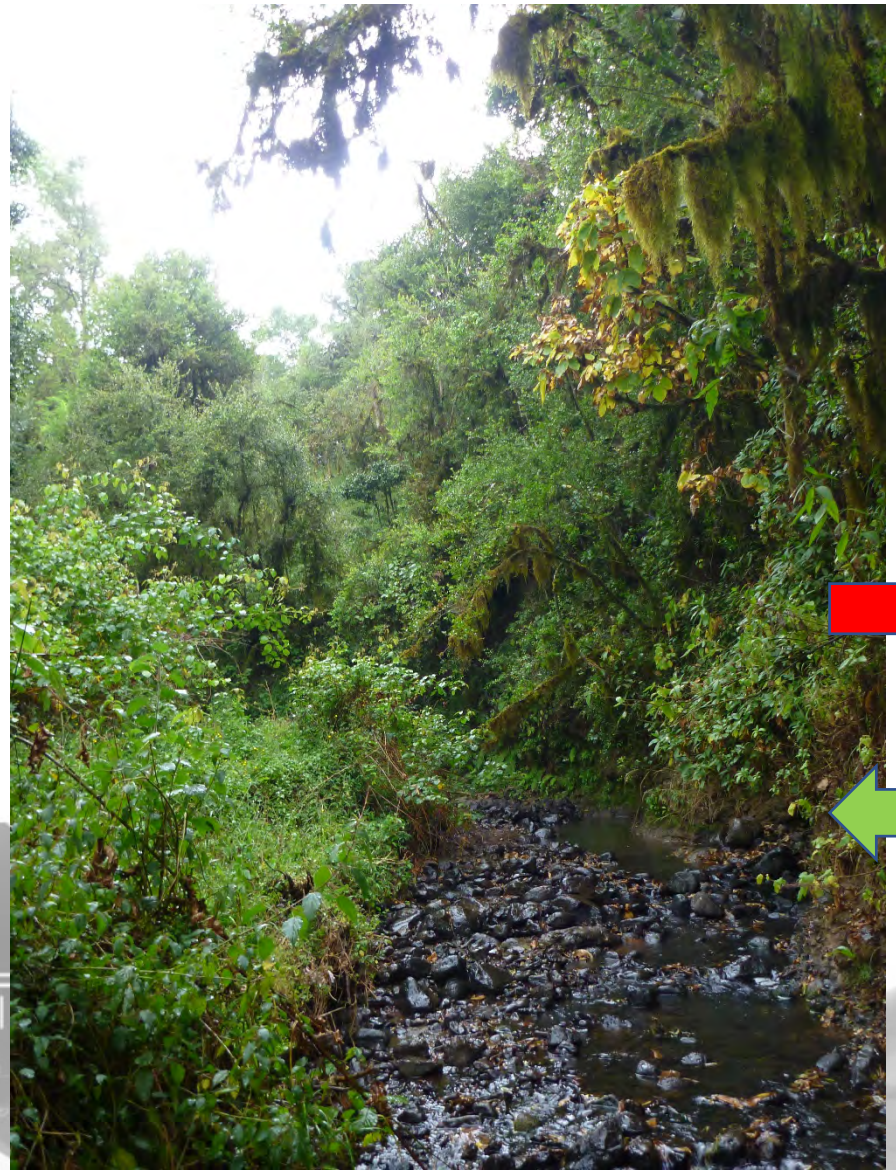
Ecosystem Services: nexus energy-water-food



From “reference” to “poor ecological status” and back?? Sustainable management!



Sustainable Highland Rivers Management in Ethiopia- LARIMA

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THANK YOU FOR YOUR ATTENTION !

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Fig. 1.2 DPSIR framework (After EEA 2003)

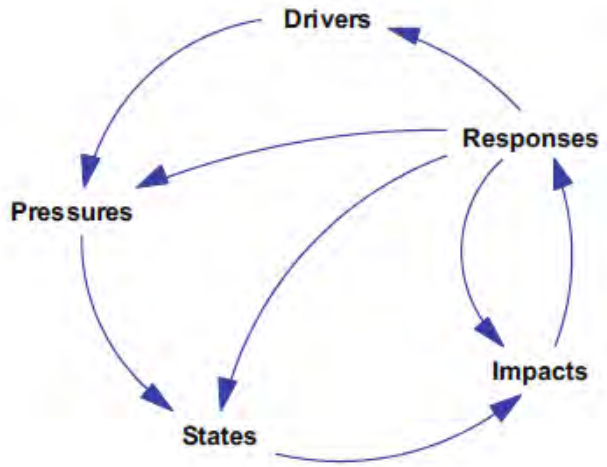
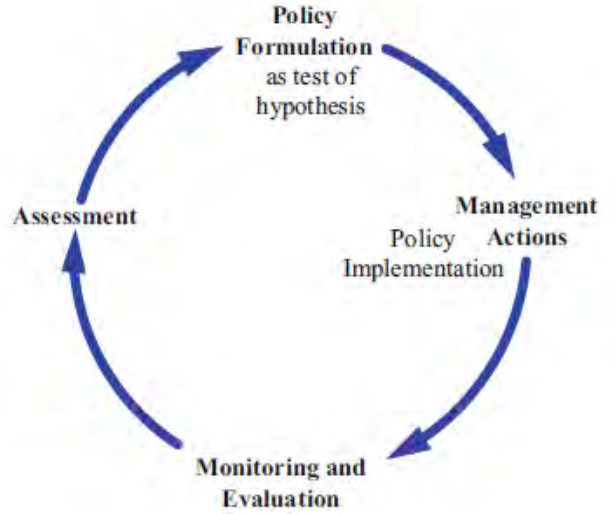


Fig. 1.3 Adaptive management: cyclic learning—decision process (After Magnuszewski et al. 2005)



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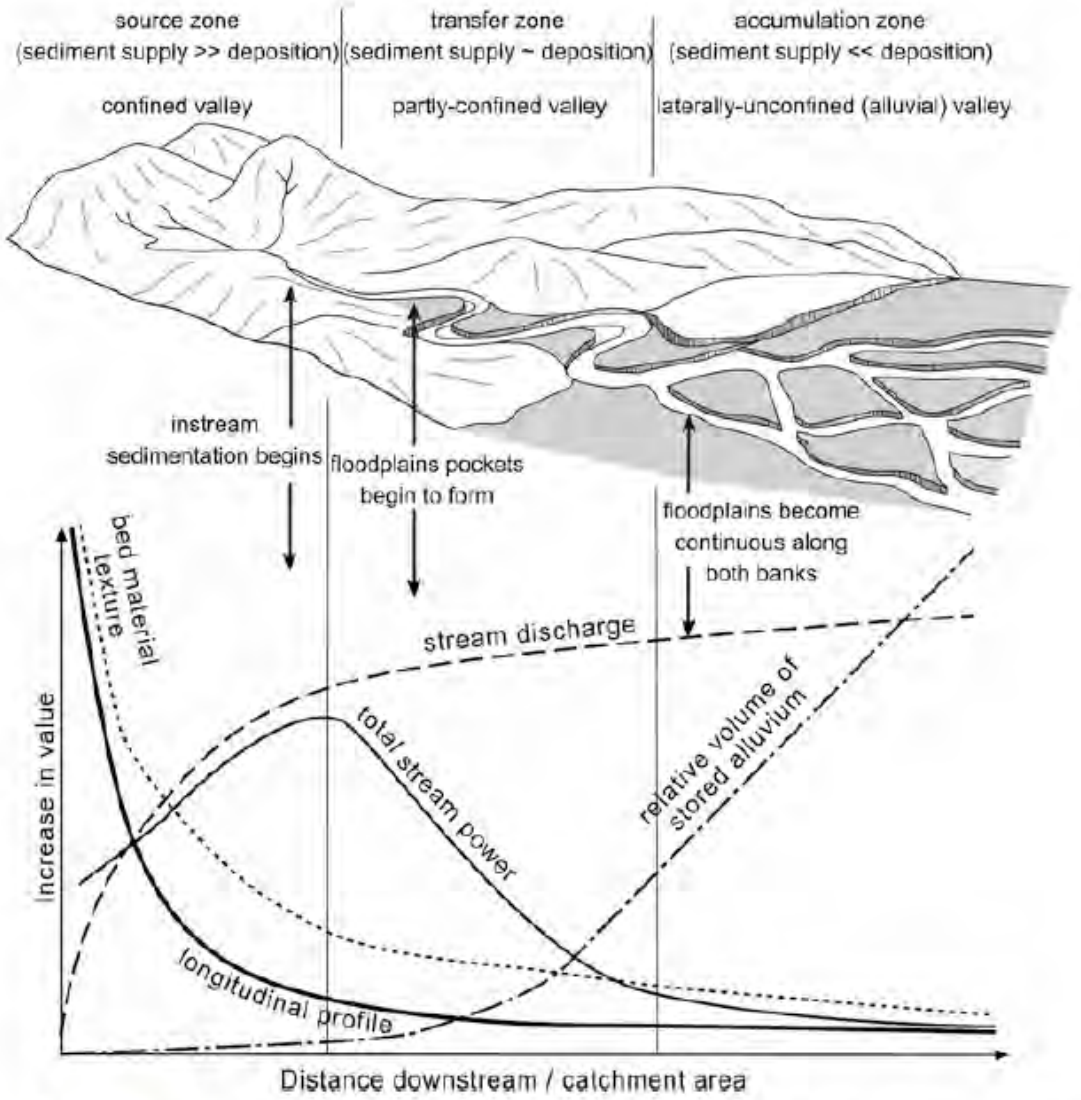

Fig. 3.1 Channel controlling factors and channel characteristics along a schematic river course

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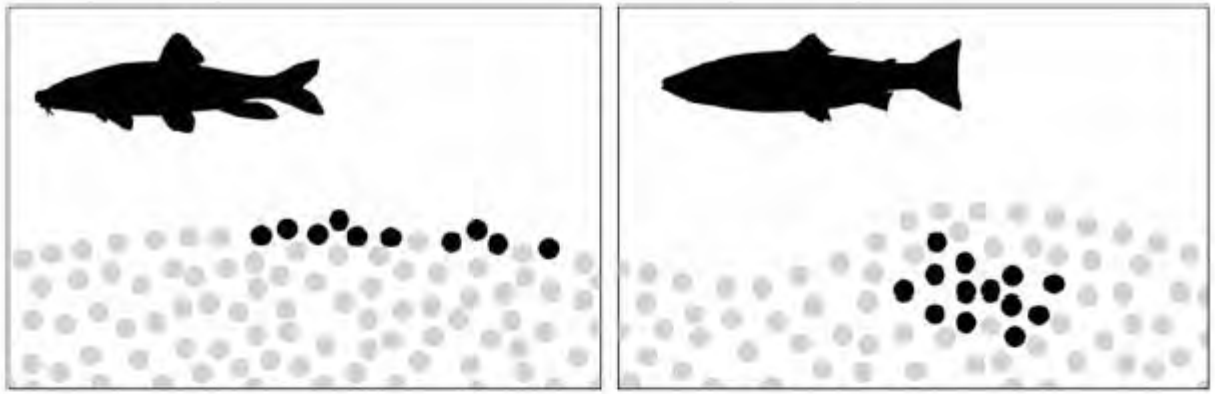
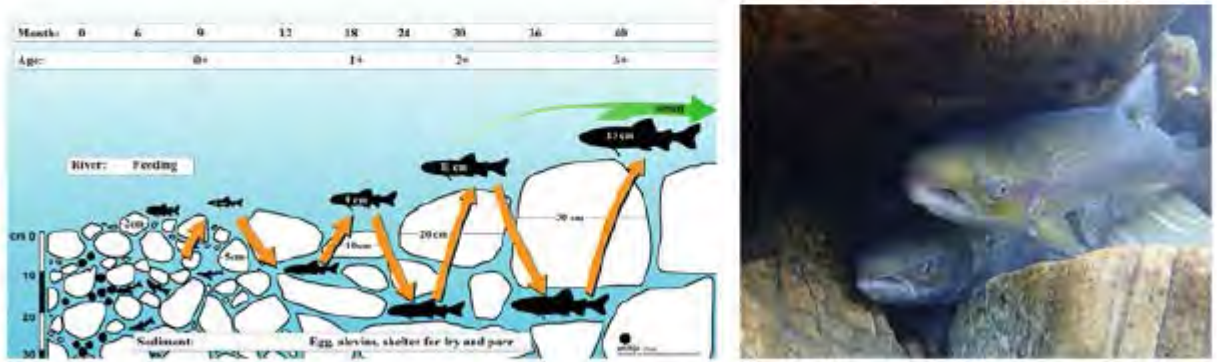


Fig. 8.4 Egg deposition of on-substrate spawners (left, e.g., many cyprinids) and interstitial spawners (e.g., many salmonids)



(a) (b)

Fig. 8.5 (a) Habitat use of Atlantic Salmon and brown trout juveniles in relation to grain size distribution in Norwegian salmonid rivers (figure adapted from Pulg et al. 2017). (b) Adult Atlantic salmon of approx. 100 cm in length seeking shelter in the river bottom of the boulder-dominated cascade river Nordøla in Western Norway (Photo: Ulrich Pulg).

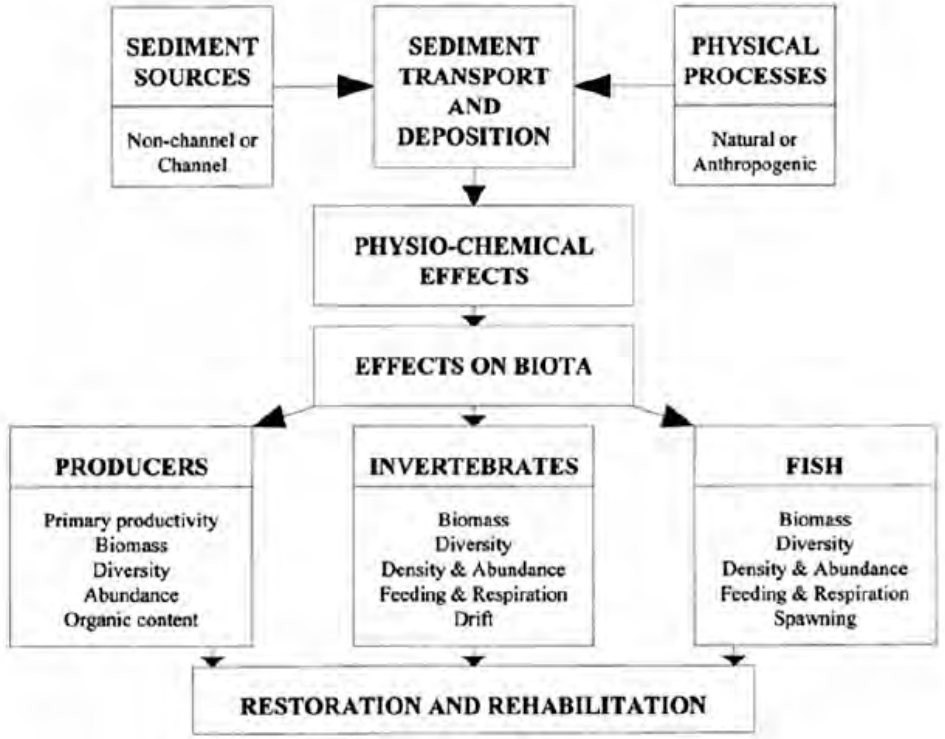


Fig. 8.3 A holistic overview of fine sediment in the lotic ecosystem, after Wood and Armitage (1997) (© Environmental management, Biological effects of fine sediment in the lotic environment, 21(2), 1997, 203–217, Wood, P. J., Armitage, P. D. With permission of Springer)

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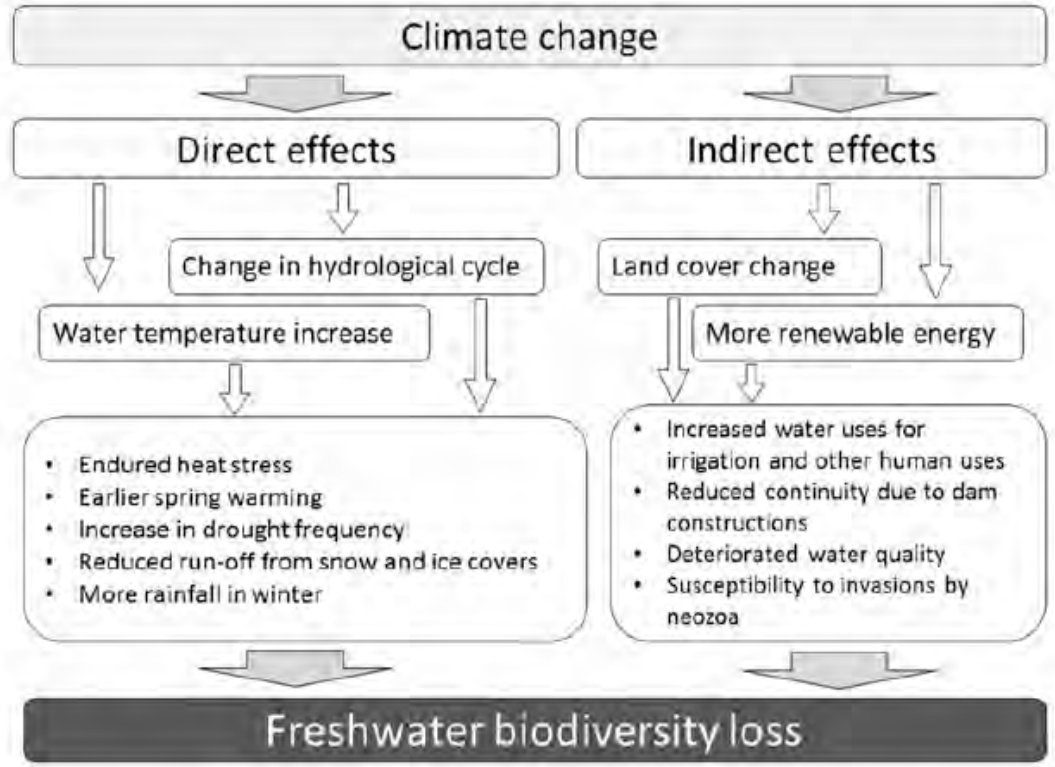

Fig. 11.3 Conceptual description of direct and indirect climate change effects on freshwater biodiversity in rivers (adapted after Fenoglio et al. 2010)

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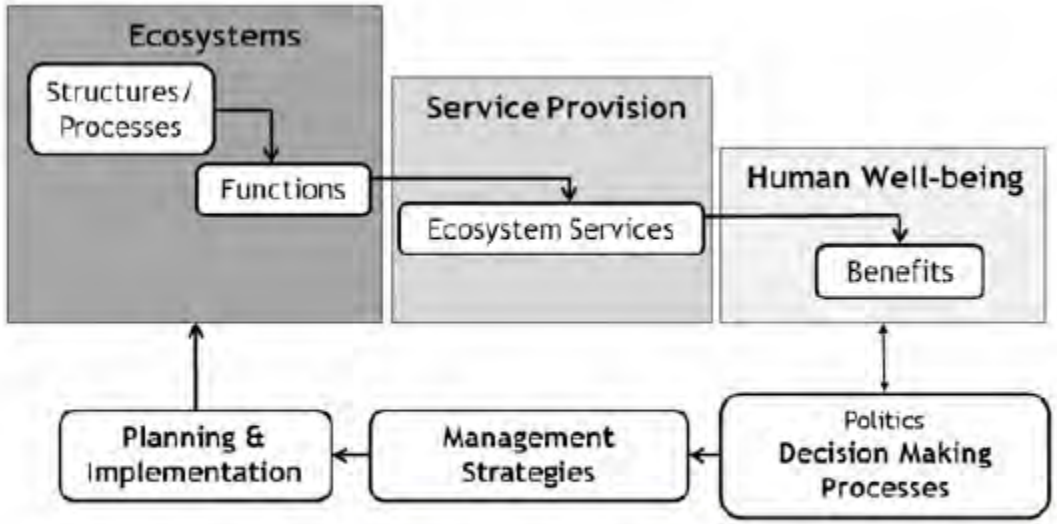

Fig. 21.1 Cascade model showing the link between ES and human well-being (Böck et al. 2015 based on Haines-Young and Potschin 2010; De Groot et al. 2010; Van Oudenhoven et al. 2012)

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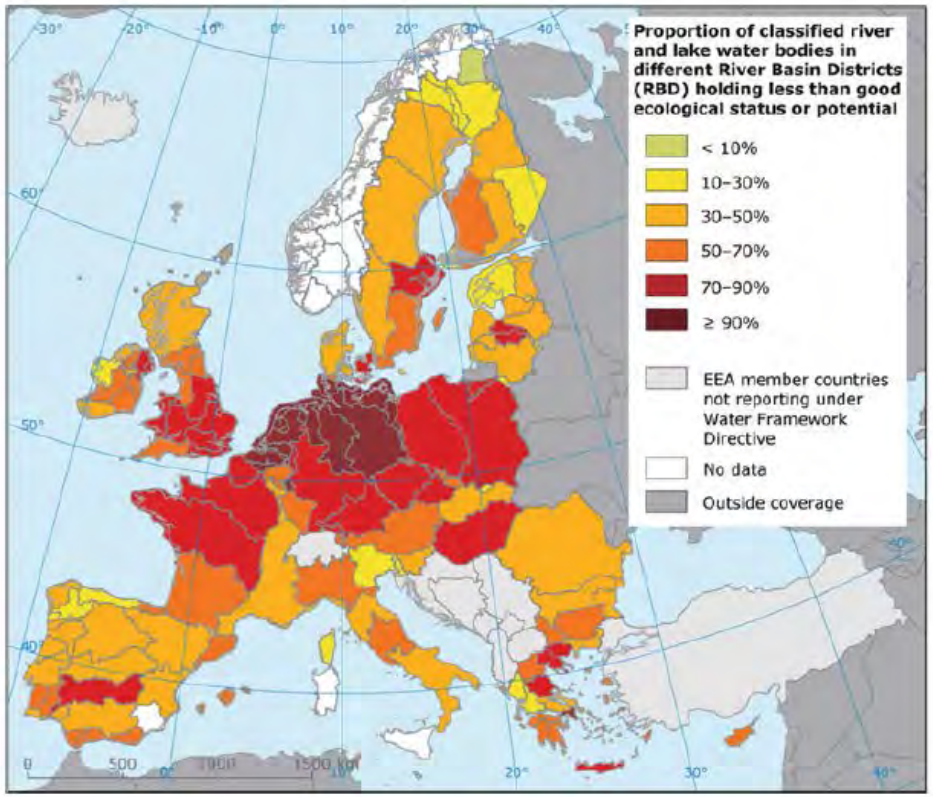

Fig. 29.1 Ecological status of surface waters in EU countries (www.eea.europa.eu, accessed 21 October 2016)

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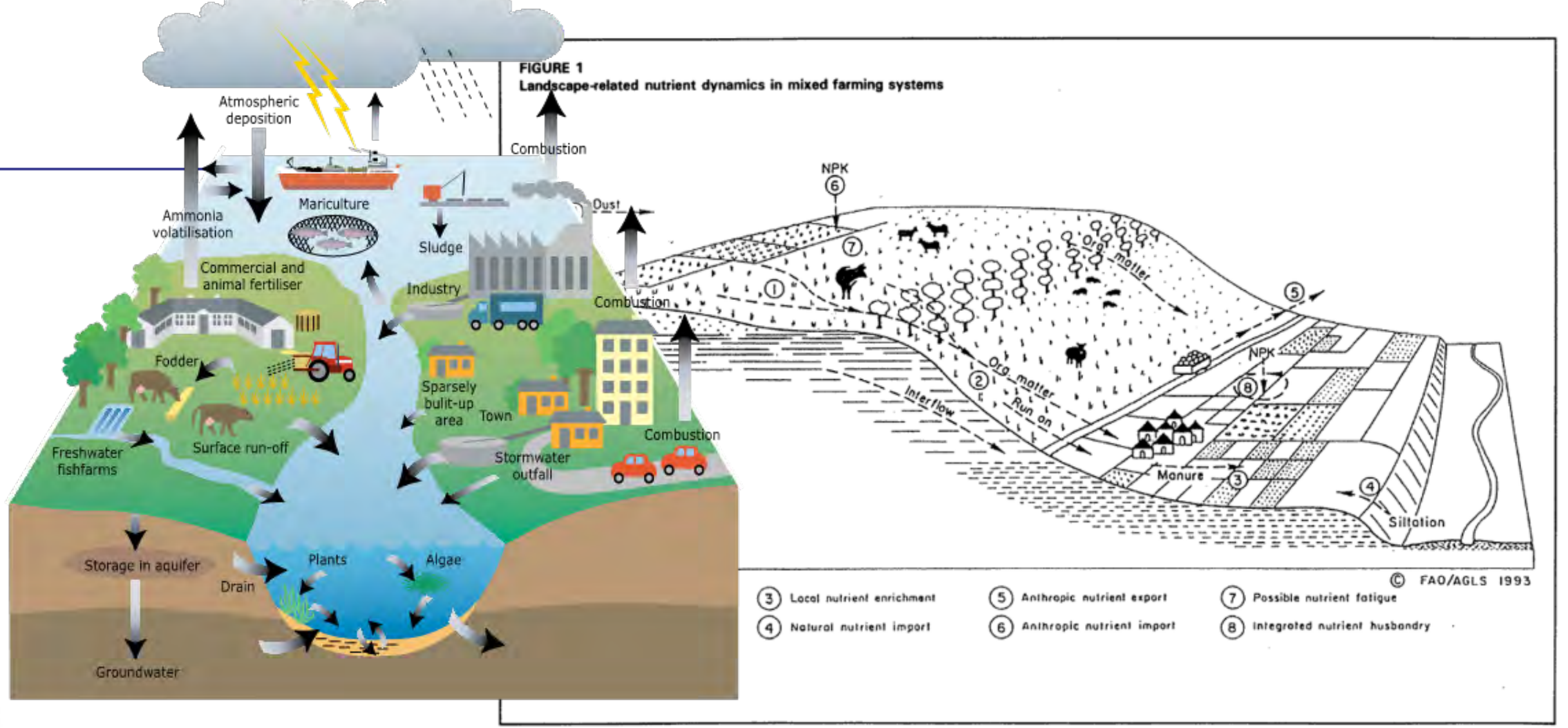

Ærtebjerg et al., 2003.

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Fig 1: The degree of river catchment degradation at selected site

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Fig 2: Shows how the land has been sliding away from the river catchment .

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Belo reference site

Cattle and other domestic animals at Belo

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sampling at Debbis reference site

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Debbis second site

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Chole reference site

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Chole more impacted site

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Huluka reference site

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Huluka third site

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Malli friin pirojektii ittiin tamsa'u

- Toora interneetii (www.larima-appear.info)
- Barreeffama gaggabaabaa yeroodhaa yerootti faca'anitiin afaan nanoottiin qopheesuu
- Maanuwaaloonni leenjii qooda fudhatootaf karaa soofti-koppii fi waraqaadhaan ni raabsamu.
- Karaa workishoopp fi leenjiin adda adda.
- Frii qoranoowwanii joornaalota biyyaaleessaa fi addunywaa irratti maxansiisuu dhaan.

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Dhabileen hojii kan qindessan

Yunivarsiitii Qabeenya Uumamaa fi Saayinsii Lubbu-Qabeeyyii, Viyeenaa – **Prof. Dr. Wolfraam Graaf** fi **Dr. Ilsee Schwarziinger**

Yunivarsitii Amboo – **Dr. Asaffa kananii Nagaassaa**

Dhaabbata Qorannoo Qonnaa Itoophiyaa (EIAR), Giddugala Biyyaaleessaa Qorannoo Qurxummii fi Lubbu-Qabeeyyii biroo bishaan keessaa – **Dr. Aschaalew Laaqoo Haayilee**

LARIMA

Laggeen Baddaa Itoophiyaa Ittifufiinsaan Kunuunsuu fi Fayyadamuu

Pirojeektiin Laggeen baddaa Itoophiyaa Ittifufiinsaan Kunuunsuu fi Fayyadamuu (LARIMA)n hariroo Itiyoophiyaa fi Ostriiyaa giddutti uumame yenna ta'u,kaayyoon isas dandeettii humna nama gama hordoffiii qaama bishanii maloota to'anna amayyatiin ijaruu, tajaajila bishaanii irratti saalaa fi hawaas-dinagdee bu'uureffachuudhaan hubanna uumuu dha.

Projeektiin kun kaayoo armaan gadi kan qabu yoo ta'u uummatta hirmachisuudhan gagefamaa

- Ragaalee gurguddoo (metadata) wa'ee bishaanii, ittifayyadama lafaa, haala qilleensaa, albuudoota bishaan keessaa, lubbu-qabeeyyii bishaan keessaa funaananii akka hundi itti fayyadamutti kaa'uu fi xiinxaluu.
- waa'ee bishaan baddaa Itoophiyaa irraa maddanii ilaluuf, meeshaa qorannoo amma hojii irra jiran (biomonitoring tools) fayyadamuun sadarkaan qabiyyeen bishanii irra jiru Amaleessuu fi xinxaluu.
- Haala laggeen baddaa Itoophiyaa ittifufiinsaan eeguun fi fayyadamuu danda'amu irratti oddoowwan qorannoo fi leenjiif oolan lama sulula bishanii kessatti hundeessuu.

የፕሮጀክቱ የምርምር ውጤት የማሰራጫ ዘዴዎች

- የፕሮጀክቱ የሰራ ዉጤቶች በትሮጀክቱ ድህረ ገጽ (web page: www.larima-appear.info) በኩል ለባለድርሻ አካላት ይደርሳሉ።
- ኢንተርኔትን ማግኘት በማይችሉ የሕብረተሰብ እና ባለድርሻ አካላት በዋህው የሚዘጋጁ አማራጭ ጽሁፎች ሕብረተሰቡና ባለድርሻ አካላት አንዲደርሱ ይደረጋል።
- በተለያዩ ጽንጽዎች የሚዘጋጁት አማጭር ፅሑፎች እና ሌሎች መኮየል ለሕብረተሰቡ አንዲደረስ ይደረጋል።
- የፕሮጀክቱ ሰብለባዎች እና ምርኸሖች በትክክል ተዘግበዉ ለባለድርሻ አካላት በ ድህረ ገጽ ወይም በ ፖስተር እንዲደርስ ይደረጋል ።
- አስክላር ሺፕ በተሰጣቸው የሁለተኛ እና የሶስተኛ ዲግሪ የሚከታተሉ ተማሪዎች የሥራ ውጤት እና በተመራማሪዎች የሚገኙ የፕሮጀክቱ ውጤቶች በሀገር አቀፍና አለም አቀፍ ኮንፍረንስ ላይ አንዲቀርቡ ይደረጋል።

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ተባባሪ ተቋማት ፡

ቦኩ ዩኒቨርሲቲ የተፈጥሮ ሀብትና ስነ ህይወት ፒየና - ፕሮፌሰር ዶ/ር ዋልፍራም ግራፍ እና ዶ/ር አልቤ ሻዋዚንገር

አምቦ ዩኒቨርሲቲ – ዶ/ር አሰፋ ቀነኒ ኒጓ

የኢትዮጵያ የግብርና ምርምር ተቋም ብሄራዊ ዓሳና የውሃ ውስጥ ህይወት ምርምር ማዕከል – ዶ/ር አስቻለው ላቀው ሀይሌ

LARIMA

በኢትዮጵያ ደጋማ ቦታዎች የሚፈሱ ወንዞችን በዘላቂ ለመጠበቅ የሚያስችል አሰራር

ይህ ፕሮጀክት በአስትሪያና በኢትዮጵያ በሚገኙ ሶስት ከፍተኛ የምርምርና የትምህርት ተቋማት ተዘጋጅቶ በአስትሪያ መንግስት የገንዘብ ድጋፍ በመተግበር ላይ ይገኛል። እነዚህ ሶስት ተቋማት ከአስትሪያ የተፈጥሮ ሀብትና የስነ-ህይወት ዩኒቨርስቲ (ቦኩ) በኢትዮጵያ ግብርና ምርምር ኢንስቲትዩት የቦሐራዊ ዓሣና የውሃ ውስጥ ህይወት ምርምር ማዕከልና የአምቦ ዩኒቨርስቲ ናቸው። ፕሮጀክቱ ዋነኛ ትኩረት በደጋማው የኢትዮጵያ ከፍል በሚፈሱ ወንዞችና ጅረቶች ዘለቂታዊ ጥቅም ይሰጡ ዘንድ ስነ ህይወታዊ በሆነ መንገድ ለመከታተል የሚያስችሉ አሰራሮችን ማውጣትና በዘርፉ የሰው ኃይል አቅም ማጎልበት ያስችላል። በተጨማሪም ፕሮጀክቱ ወራጅ ወንዞች ለህብረተሰቡ ማህበራዊና ኢኮኖሚያዊ እድገት የሚሰጡትን አገልግሎቶች ይዳሰሳል፣ያስተዋውቃል።

የፕሮጀክቱ ዋና ዋና ዓላማዎች

1/ የወንዝ ውሃን ጥራት የሚያሳይ የመረጃ ቋት ለማደራጀት የሚያስችሉ መረጃዎችንና ፅሁፎችን በዘመናዊ ዘዴ ማሰባሰብ፣

2/ ስነ ህይወታዊ የወንዝ ውሃ ጥራት ደረጃን መከታተያ ዘዴዎች መገምገምና ተስማሚ የሆኑትን መርጦ ማላመድና ማስተዋወቅ፣

3/ የወንዞች ጤንነት ደረጃ ሊያሳዩ የሚችሉ ሁለት መከያ ቦታዎችን በመምረጥ ለትምህርት፣ ለስልጠናና ለማሳያ አንዲውሉ ማድረግ፣

LARIMA

The effectiveness of benthic macro-invertebrates to evaluate the impact of different stressors on ecological health of upper Awash river

Ayana Chimdo[1], Aschalew Lakew Haile[1], P.Natarajan[1], Wolfram Graf[2], Anne Hartmann[2]

1) Ambo University, College of Natural and computational Science, Department of Biology, Ethiopia

2) Ethiopia University of Natural Resources and Life Sciences, Vienna, Austria

Introduction

One of the common resources for all life forms on the planet is water.

Water never exists alone, but it is a part and parcel of ecological unit consisting of land, substrate structures, flora and fauna.

In highlands of Ethiopia, human activities such as land modification, urbanization, industrial wastes and other practices associated with rapid population growth are the major river water quality degrading factors.

Agricultural practices such as crop cultivation adjacent to streams can lead to soil erosion and subsequent runoff of fine sediments, nutrients and pesticides in the river water.

Similarly stream banks along the stream channel are commonly inspected by cattle for year round availability of green grass which could lead to soil slide into the river and causes siltation.

Diverse types of pollutants such as suspended solids, organic matter and nutrient have adverse impact on water and biota in the river system.

Objective & Study Area

The purpose of this study was to determine the impact of different stressors on benthic macroinvertebrates community structure as bioindicator in the near source of upper Awash River.

The study area is located near to Ginchi town about 80 km west from the capital Adiss Ababa, lying between latitude 9°00N and 9°10N and longitudes 38°00E and 38°40E.

Four sampling sites were selected based on major stressor type impacting the river section.

Site 1: about 500 meters from the confluence of Arera and Wareba spring flowing through natural forest in the stream bank and Eucalyptus plantation in the near catchment. Animal watering is some of the important activity in the this site.

Site 2: a river section about 3 km from site 1 and mainly dominated by farmlands both in the left and right banks of the river. A grass buffer zone about 30m width in both sides and scattered bushes and trees with no shading on the stream.

Site 3: a river section below the major bridge from Addis Ababa to Ambo and impacted by physical in-stream activities such as intensive cloth washing, car washing, cattle watering and domestic waste damping.

Site 4: a river section about 800m below site 3 and 100m below the paper mill waste discharge.

Biological Indicators

Biological col indicator organisms, benthic macroinvertebrates (BMI) are widely applied for assessment of wadeable streams and rivers.

BMI are affected by changes in a stream's chemical and/or physical structure and they are sensitive in varying degrees to temperatures, dissolved oxygen, sedimentation, nutrient enrichment, chemical and organic pollution.

This sensitivity allows them to be effective indicators of specific stressors affecting the water quality and overall river health.

Results

EPT taxa groups were highly reduced in the paper mill waste site (site 4) and represented by few tolerant Baetidae and Hydropsychidae.

On the other hand tolerant taxa such as Chironomidae (red color) were dominant in site 3 and 4 which shows high nutrient enrichment largely from the paper mill and in-stream activities in a significant amount.

The dramatic decrease of EPT taxa as well as decreasing ETHbios scores from site 1 to 4 is highly corresponding with the decreasing forests along the river. The natural forest coverage corresponds to less anthropogenic influence and might be a good indicator for river health.

Conclusion & Recommendations

Compared to the less impacted stream site in Chilimo forest, downstream sites shows decreasing water quality and habitat degradation which altered benthic macro invertebrates community structure.

A clear trend in biotic metric was observed to predict alterations caused by specific stressor, mainly the point source pollution, as the case in paper mill waste. The river water is used for a variety of purposes such as drinking, irrigation, cattle watering and domestic purposes without prior treatment which may cause serious health problem and affect the livelihood of the local community.

Therefore, enforcement of environmental law to control point source of pollution and propagating environmental education to the community is crucial. Moreover, continuous water quality monitoring should be employed using reliable methods and the local communities should be aware of the potential dangers of using polluted water for various purpose.

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