Fisheries & Aquaculture News

FAN BANGLADESH

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Aquaculture
Fisheries Management
Marine Resources
Livelihood
Biodiversity
Knowledge-base

BFRF Bangladesh Fisheries Research Forum

6th BFRF Biennial CONFERENCE 2014

Call for Abstracts and Full papers

- 6rh BFR.F Biennial Conference & Researsch Fair 2014 will take place during the last week of January, 2014
- Plea5e submit the abstracts based on your researches, survey,. development work on any areas pertinent to fisheries and aquaculture before December 15 . 20'13
- Abstracts for high quality thematic posters are also. welcome!
- BFRF also expects full papers before the conference

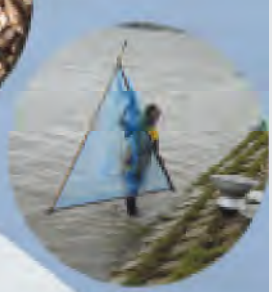
Abstrocis con be prepared on the following themes (but not limited toy

Fisheries crid aquoci...ltutio cleverilopmeni and climate change adoplutior
Quality aspects of fish product- Food safety and secJrily
Fisheries education and instautioncl course curl culc:
FlErolarief CIOVVIOPmerrt in coastal belt
Sustainable fisheries development
Ethiccil aspects In oiquocurrure
FloacIplain and wetlands
World Fish researches
Gender and fisheries
Poverty alleviation
BFRF researches

41k 01",

Pleats sut fl t 'Mgr Oft COY your ablirOCt to-

Prof. Dr, Nelo, Abdul Wahab_bai@y□hoo cam
Dr. Bengv Bogrrncri B.RcurnQn@gOgr.grQ
Dr. Mos'terra Hosscal MOStaretICASC1141:Fau.edU.1210



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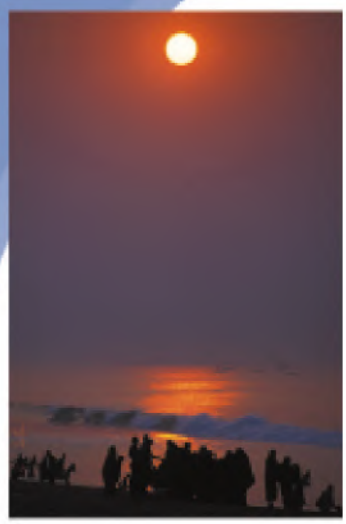

BFRF Is a notional non-political and non- profit professional body witri the memberships from the universities. DoF, BFRI. UDC.. hiGOs„ private sectors and others invohied and committed to fisheries and aquatic resources development.

The membership Is open to all student& teachers, researchers, formers, hatchery owners trader& fish & feed processors. GO & t..1GO official& donor& policy makers. private entrepreneurs and anybody 'olio are involved with fisheries and aquaculture at Bangladesh.

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forefront research NI.
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editor's column

Editor's Column

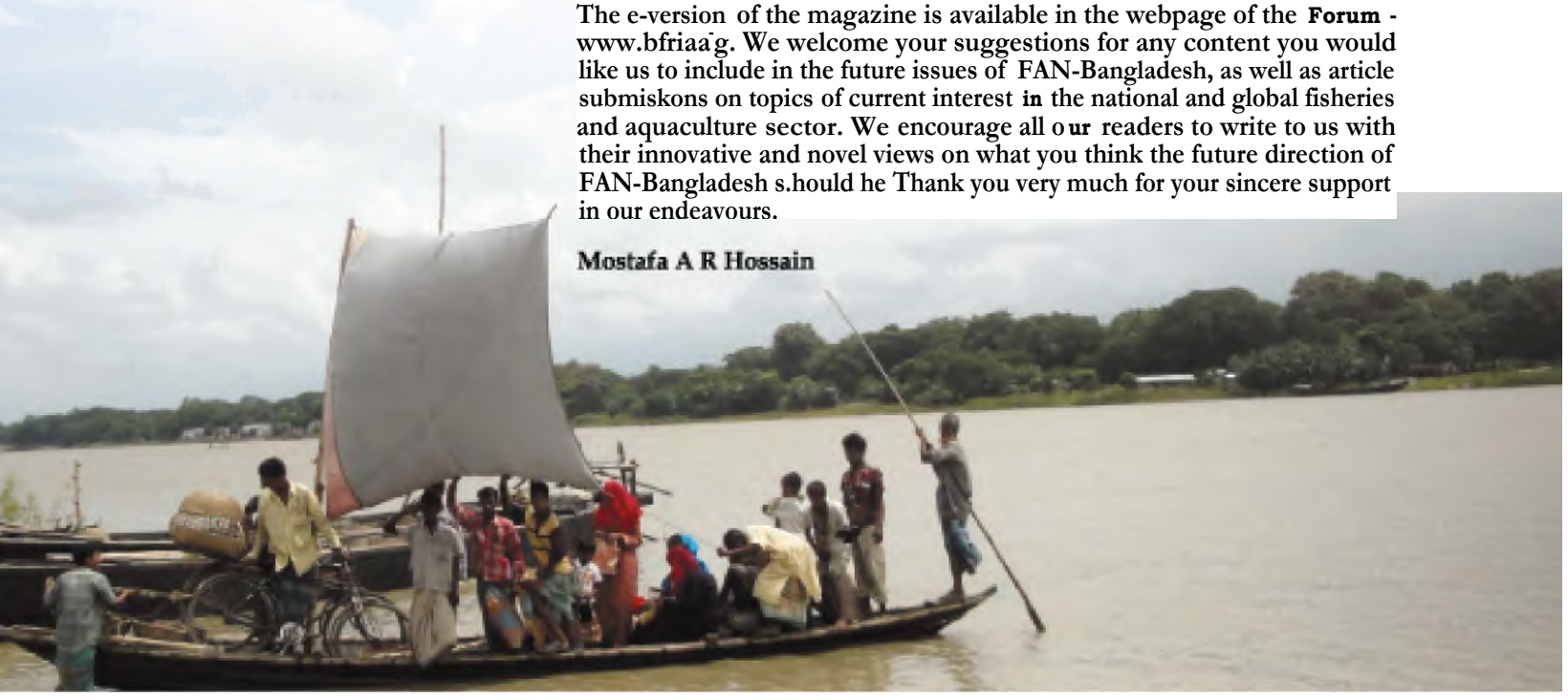
The fact has been weed upon globally that fisheries Sector is one of the mainstays in achieving road security, poverty alleviation and increasing national income. The BUSiairiable expansion of the sector in Bangladesh, however, is facing a variety of socio-physical,, environmental and technological challea-iges and can be asEistedi t ough quality research and development In addition,. there is an urgent need to educate and to establish a greater understanding and appreciation of Country's water bodies and aetic organisms to people from all strata to pave the way of their 5usta- e management to meet the nutrition demands of a rapidly expanding population of this region. CoB and the donors have placed major emphasis on culture and capture fisheries,. promotion of integrated farming, CDnsow iion,. management, and dlevelopment of institutional framework and need-basedtraininj. is the high tune for all concerned and working for the betterment the fisheries sector in bangladesii-(Eh farmers, fishers, general people, local leaders, university te achers, researchers, media personnel. policy makers, CO and NCO workers to Mlle forward to nkanap the systems and organisms and to increase the Fish production througa effective coordination, long-term pro•iamme and sustainable approaches.

Bangladesh Fisheries Research Forum (BFR.F) is a national, non-political and 110ri- profit prole-ssianal body with the memberships from the universities. 330F, IWR1.. BFLW.:, NCO% private sectors and all other departments involved and committed to keri.m.- and aquatic resources development. There continues to be exciting new challenges in terms of the reseuch new to support the ongoing rapid development of the national and regional aquaculture and fisheries sector in ensuring that it groy,-s in a sustainable and responsible manner. Hence the .13FRF has important role to play in providing forums and vehicles for the discussions and communication of cutting edge research and technolo gy_

As you know FAN is the first ever English popular journal in Bangladesh that covers all the aspects of fisheries and aquaculture in the country and in the region. The first issues created a sensation regarding content, design and response from the readers. It has been distributed widely allover the country and also in overseas. This is the second issue of the magazine.

The e-version of the magazine is available in the webpage of the Forum - www.bfriaa'g. We welcome your suggestions for any content you would like us to include in the future issues of FAN-Bangladesh, as well as article submiskons on topics of current interest in the national and global fisheries and aquaculture sector. We encourage all our readers to write to us with their innovative and novel views on what you think the future direction of FAN-Bangladesh s.hould he Thank you very much for your sincere support in our endeavours.

Mostafa A R Hossain



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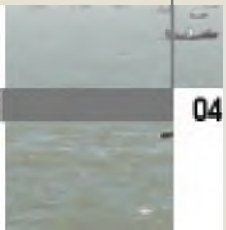


Soft Shell Turtle Culture by Ad!vas! Households

A.K.M. Nomad Alain and Saifu.Bah Bin Azie
Eking.Ipcics.h A Departmeet ntrwecidllyaclAcurn
twol rhivin•Fity,. , Anzeda Mohan Govi.
ensitl e 2202 Mymenianigh.

The hindiversity of turiLes in Bangladesh has been seriously thine:garbed dui to **excessive exploitation and ha6iiat degradation For increasing demand** icor its tasty flesh as food. Eking an important food **item far certain class4m af people and as an exportable commodity, its exploitation from the natures. has increased manifolds._ So far b6ther any** 11'1drla **gOILC Ili measures** have taken to conserve the **turtle MI cuLture practice has born initiated in the country.** CCIMidErtlg **these backdrop% Mime poterdiaLs cif frashwaber** turtles by **Adivasi** 0'.1:1101Luitica was investigated under a **ea-management apgpproach. ACIt731:111 such as Cara, haying.. Coach. Dalu etc,** inhibit in the districts **Mymensingh (Haluaghat and Dhabaura),. Netrokona. Purgapur and kalrnalkanda)** and **Sherpur (Nalitabari and fhinaigati). In mom the Adivasi people are .always abstained** from the **mainstream development activities and live in iseation within own** boundary. The purpose of **the study was to develop an appropriate culture technique for freshwater turtle** compatible with **the local conditions and iclentifyin.g *the* potentials** and **constraints of turtle culture in Adiyasi .areas.**

Baseline survey and scooping 74.4earcit

A baseline survey was condui tell in the boarder areas of Mymensingh, NetrEA.cuiil reNci **Sherpa disiticts for resourui. uN.costrient of** freshwateT Haile and its culture pellh.ntials. Baseline .4-.3rve). ;Bch:11M collection of &Litinnaltion on the .a)Lerc.e* olnd **O i** the battle species, **Imbi Fats, collection and marketing. consumption pi5ffurrh. people involved and their indigenous** L. **nov,fledge with turtle 9.**

A scooping research was also =led out to select suitable locations and ponds in Adivasi villages for culture of turtles. Community people were organized and pRA conduch..(1 044.11 location for collecting d.e i red niferrrnAhmi RI.E1irrt **gene,rated Froth the study provided** Mnidel!nt-4 kir fin WIT s7ticiy Clu, **militia restoration dewelopment through co-**rn,' rhi,prrient

Na.tus of watzr body ire term of turtle

lociutiati	Teta] Nr541	Bermuda]	&Wand	ail] ;:i_ltirr	Water.badly diatom Without Inundated fish cut =		Not ibuifidafol	Ponds with tulle
lisluaghut	27]			153		nil.	27]	IIFURAPIT T *gauge*
Dhohaura.	1E13	5		173	]0	nil	I13	tit
Du gaper	145	4	1	105		40	105	L. poicrata
Kalaiskanda	1E13	sit	3	173	10		105	
Kaisbari	271		3	251	20	•		
ibinaigati	20]			177	24	nit	20]	

Turtle species and culture practice

Thant are* **4 species of** turtle found in the **study areas. Baseline survey revealed that at present** there has been no ekisterEe of cultivable **soft shell or flapped shell turtles the** wafer bodies in Adivasi of **Mymensingh.. Netrokona and Sherpur,, although they were** found in huge number in the past. C=outurier **freshwater box turtle, Kachuga lgachuga were frequently found. Peacock soft turtle (Thotryx irmonik.. Gangetic soft shell turtle** (Triortpc guirtica) and spotted flapped shell **turtle (Limit Alp plitorligto) were found to be releaml. in several fish ponds out of curiosity-**

The bicArtgy rrqlshwater soft shell and op:Med were studied ice ponds of **BAL)**

:;11,11,..3: _no in belong to Aclivasi people rgapur. Hahtaghat and l ul akard2,4 **for 6 months from June to November. Fiveponds owned by the cormnunity in three locations were bri rught tdVier Walk culture. The ponds were** (4'ncivAted la Suiie **of turtle (-OLIN! with the** irp.mlyurrilt of **the community. Till-Hes** Were ri.liwied with acleivaie fernalu r..1110 euni C:11. cDniniunity WPTe' Insined on **mull. feekial. breeding te ttuliques _HO Nampling turtles. Turtles were fed with E:** IN.q.d. Le-t me AY Attinligli **origin vidt, chick.en pnimiils.. earthworm.. snail, mollusk, leftover huillaul food and formulated fish feed at a rate of 4% of the body weIghE** -/ *day-* **Tutles. in** potwis were Naccp.L.L3 ii r•li]ar ihterals with scCIDE, UPII dri:1 tlmis **And ipm,dAl maturity**

LAICal turtle spaelt3Ti

EmEListi name	Local nitmy	Ritually nH my	Present	203.rs hark
Small box turtle	Als ft	.Kutirragp icathrgii	till obseweii	Huge
Spotted flap-shell ludic	wrirr vktrE	Li'ssentysplOreidta	Hardly observed	Available
Sort shEll__lk	igsr Ttri	T.r.ro w Aura 119	Hardl:,1 observed	Available
River aaft obeli turtle	Itikrr	MI69)Ngallgedea	Hardly observed	Available

Soft shell turtle (T. loriilirtr) Arid spotted flapped shell turtle(L. punch:its) ew well **in pond coriclitions with** Nvengeltrileh **of 15.4** 1.6 and 3.4 13 in and average **weight of MCP 230 and 64(1 75 g for T.** hilr rovr **anti. L,** *pienetatig* , respectively. ba**th the sperm were found to be healthy tuul active** Veith r **Si.gt of disease.** T. ill'UFWB was found to breed during **March to July as** it ISyS egg' **on April and the egg hatches in** July. On the other hand,. L puirrebela was found to breed wring **September to March with egg la** it on October and **hatching on February_ While monitoring breeding performance it was** found that T. Minim passed **the breeding season before the** L pkitrarolit wete, however.. found to be vown **for breeding adecluatt.ly as it [aid** eggS **in October inside the** sandy **mail of** *the bank.* **"The eggs were collected, examined and the fertilized ejw were kept** in holes in sand-vein of the artificial hatchery **developed** git **pond side. After keeping the eggs** inside the **the top of the whole area** wee aryereti with Shed to prerteet frOrnt rail,. **it It** expected that the eggs would be **hatched** out within 2 months.

Eggs laid by the turtles were collected, Examined and *the* fertilized eggs were kept in holes in nand-vein of artificial hatcher). developed at pond snide (deep. 4 cm: distance between holes: 2-3 cm). After keeping the eggs inside the the area was covered with a shed_

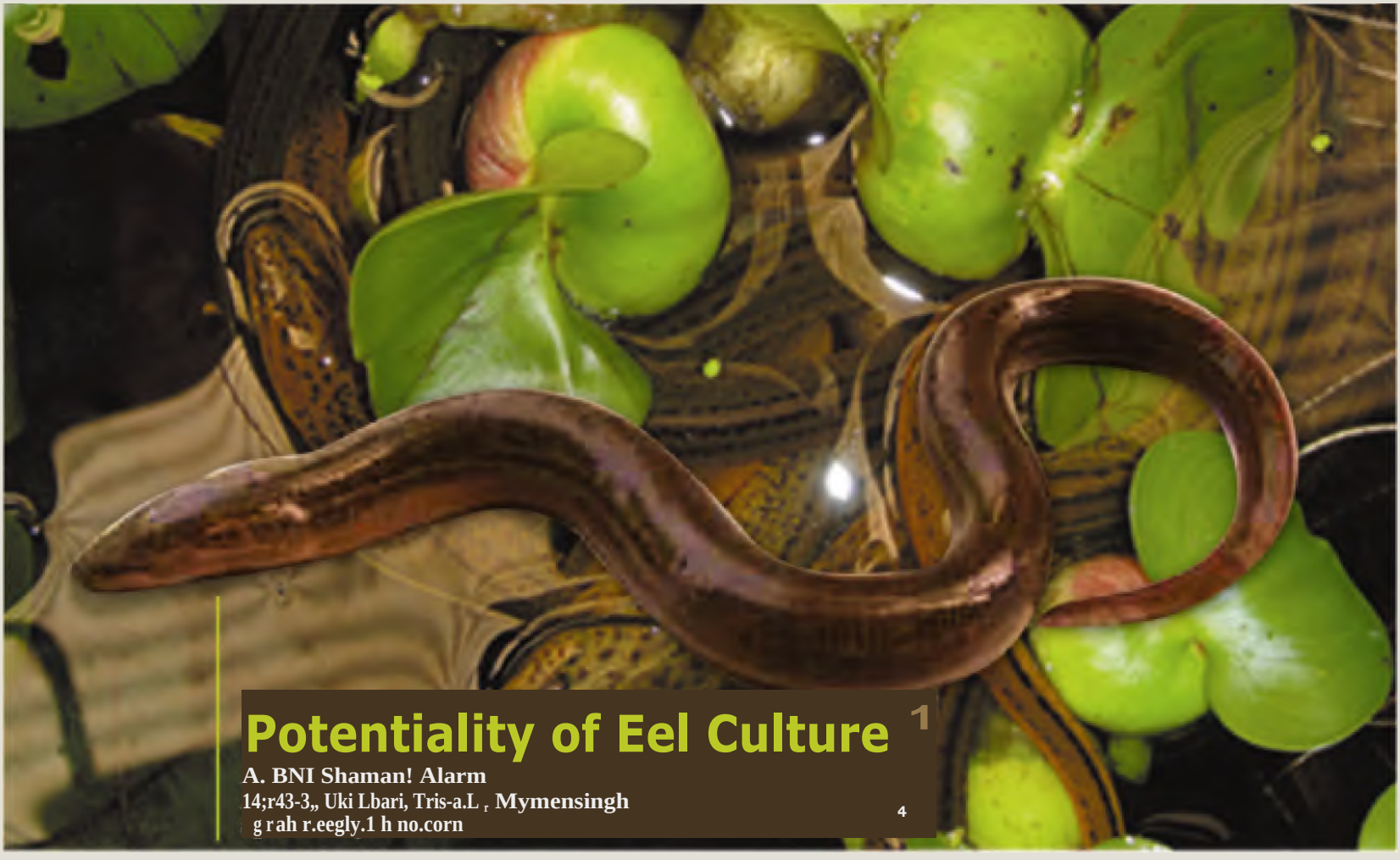
Co_rnanagminEnt activities

Adivasi communities were found to be reluctant to take any ownership of this culture study. Turtle are expensive food item: one animal of moderate size could be sold at 11.400'-11:111/kg and easily been theft from the pond. Severe] IE(perimental species were theft while conducting the study. Pouching was found to be the most important single reason for poor response towards developing co-management initiatives among Aclivasi communities. However, through scooping studies and with series cortsurtaticals and aware teas **five pons** owned by innovative Ad ivaSill in three locations were brought under turtle culture. Very informal pond_sate dionoristralion trairlings were el:Inducted let aLL locations. A total of 27 community people were trained (5 in Elirishiri ire Durgapur, 10' in HaLuaghat and 12 in KaLluakanda) while 22 of them have own ponds and interested to culture turtle independently.

The major cortstrainis were back of knowledge on turtle culture, lack of own suitable pond, lack of capital for renovation of pond and purchase of brood/seed-initial high inviintrient, lengthy and cumbersome culture method, unavailability of seed/brood in time, dependency on Indian brood/adult supply, not pcnsible to culture fEsh in a same pond, high *feed* cost, pouching, self eaten-out during festival, risk associated with unknown business and unknown culture method. In spite of all these constraints the AcLivasis of the north had made the turtle culture possible showing their strength as they were comparatively better organized community.

Acknowledgement

The authors duly acknowledge the financial assEstance of RangLidesh Fisheries Research Forum_



Potentiality of Eel Culture [1]

A. BNI Shaman! Alarm
14;r43-3„ Uki Lbari, Tris-a.L , Mymensingh
g r ah r.eegly.1 h no.corn [4]

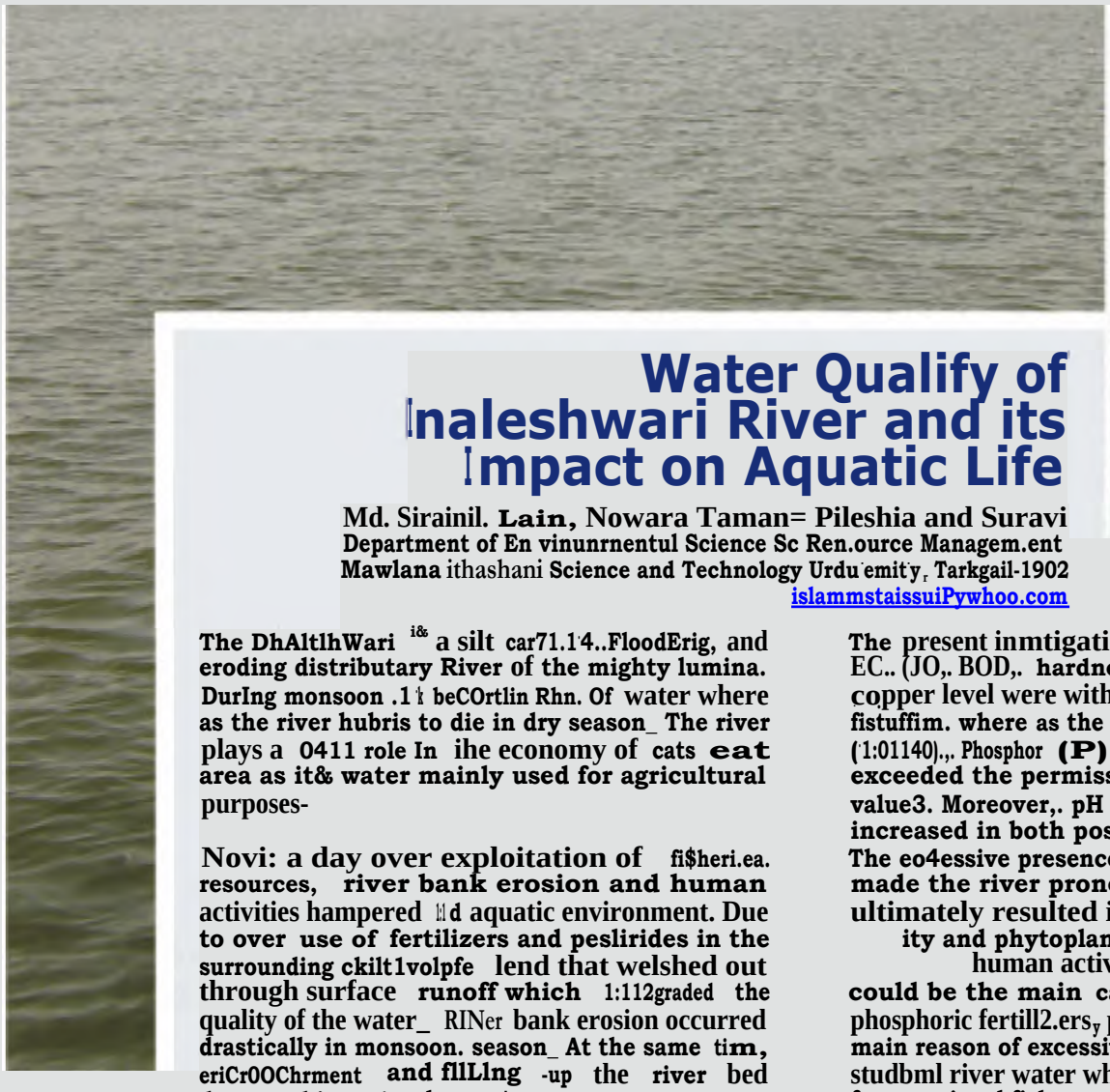
ICs been 13113 and a half year since I first thought about tel culture in rkngladesh. One. Chineie company owned by Mr_ Lee of 1.1bay province, China has encouraitd llle to initiate eel ci.dture in ladesh. On Fe MX receded about 1.0D Asian. swamp ee (Plcittevietos 4bus) frorn Mr. Lee. It is also popularly known *as* rice field eel. The eel usually found in our countlyis cuchia (Moraopkriis conch). There are some differencm between the two species irk colour, body and heal shape_ Mateuistems arbus has an elongated,. snake like body with a. b11.3.fit, rounded. Rose. It does not .a... eu to have any *fins* and its slippery skin is gretri. or brOrmfti on the fori. wtrig lighter towards under belly_ They can grow to a length of 1 meter and weight up to 500 g.

The time whet) I gcrt the eel *stock* from China, the temperature of our country was about 25 °C but the temperature of Ubay province, China was 4 -C Due to temperature CliirETerlZE, mas sive mortality was found (about 50% of the total imposed stock). I was looking for the info ation to keep the remaining eel alive and to breed them. Finally L went to China and learnt the feeding, breeding and cultitre. of eel- The theoretical information about eel culture and breeding was provided to me by Prof- Dr Jima. of Llbay Agricultura.1 University. It is the tar seat Agricultural Ultvemity of aim and Prof. Jhaa has been worbartg with eel for 20 years. Now 1 have succeeded in breeding as well as ci.dhire of Asian swamp eel_

Facts *of* Asian swamp eel (Moriciptertis *&us)*

After hatching,. all fry are female_ With growing as mature females,. sonic females changes seK to mares. Males can changim. sex to females if female density is low. The 54TX ChalligCli may continue up to one rm._ Re. ..uction can cccur throughout the year. Up to 11411 cgs` per female perspawning L'Illr may result_ Eggs *are* laid in bubble nest Located in shallow water. Bubble nests float at water surface and are not attached to aquatic vegetation_

Asian swamp 6e4d *eel* is a favorite dish of Chinese people. In recent years the col culture has illMASed Marliki 1th in China with the price of LW 4-5/kg (mean individual well* 200g). Chines!: traders are willing to buy the eel fish from BangLacleah.. The eel mziket is very wide. The people of eastern countriet Like China, Thailand, Cambodia,. Vietnam,. 1121 BEI etc are the main consumers of ed as food Fish. ugh culturing eel in our water bodies,. we can impend our export commodity and earn valuable foreign 0.13TEriC'y.



Water Qualify of Inaleshwari River and its Impact on Aquatic Life

Md. Sirainil. Lain, Nowara Taman= Pileshia and Suravi
Department of En vinunrnentul Science Sc Ren.ource Managem.ent
Mawlana ithashani Science and Technology Urdu emit'y, Tarkgail-1902
islammstaissuiPywhoo.com

The DhAltlhWari i& a silt car71.1'4..FloodErig, and eroding distributary River of the mighty lumina. DurIng monsoon .1 t beCOrtlin Rhn. Of water where as the river hubris to die in dry season_ The river plays a 0411 role In ihe economy of cats eat area as it& water mainly used for agricultural purposes-

Novi: a day over exploitation of fi$heri.ea. resources, river bank erosion and human activities hampered ld aquatic environment. Due to over use of fertilizers and peslirides in the surrounding ckilt1volpfe lend that welshed out through surface runoff which 1:112graded the quality of the water_ RINer bank erosion occurred drastically in monsoon. season_ At the same tim, eriCr0OChrment and fllLlng -up the river bed destroyed its natural soundness

The present inmtigation 5114)wed that the levels of EC.. (JO,. BOD,. hardness, Sodium, Potassium and copper level were within the standard IimLt set for fistuffim. where as the contents of Kjeldahl]Nitrogen (1:01140).,. Phosphor (P) and Cadmium (Cd) in water exceeded the permissible Limit of the standard. value3. Moreover,. pH was decree wd and TD5 was increased in both post and pre-monsoon period_ The eo4essive presence of 'Nitrogen and Phosphons made the river prone to eutrophication, which ultimately resulted into degradation of water ity and phytoplankon. blooms. Nutrient from human activiti. and other animal waste3 could be the main causes of this problem_ 'the phosphoric fertill2.ers, paints. and Clye3 C01.11.4;1 be the main reason of excessive concentration of ed in the studbml river water whiich Es the re3ponsible lector for occasional fish mass

Water quality parameters of the Dhaleshwari River at Tansail area

Parsmarrs	SeBPJEll (Immo f SD, N-5) Mumma	Post-monsoon (Oct. Lan.)	Pre-m4xISDOn Yeti. -May)	Standard
Tesaparaiure (PC)	11.52±1.14	23.L9± 1.62	12_43 ± C1.44	(EQS. 190)
framkpantrity (tm)	15.05 A-6-0			411 cri- leas {Rah-that 10⁴)2)
EC (Alen)	155.20 ±2.2.M.	431.60 ± 136.33	36530 ± 10_61	700 (EQS 097)
	78.10 ±9_'71	736:40± 75Ai	21:14313 ± L143	165 (1-hhi Safi A Lull 2E45)
PI I	7.521 0.07	5401034	5.33. 10.47	6-54.5 (Dal 3911
	6,63 i 1.21.	6.43 ± 1.83	6.3730.19	5_0 (FM. 1 9'7,
Alkaliai4'(pirm)	15 120.11	404.60 11513.85	17A ± 131.52	Icith(Faihrnan 1992)
Hiirdnysa. (ppm)	50.013 113.04	32..1301 7.53	4160 1 3.39	123 (Hug wad 11.1.= 2005)
To41 Nitrogga (ppm)	14.561 5 29	10.92A 1.53	9. MA0-99	1.0 OCR I#97)
Fb.m.f-11-.-rm (rpm)	1112+ 0.04	01.510.LO	0.1:9 ±0.03	0 (ECR 199 1)
Koinirr (prpm)	5.69 0.93	14.591 E.133	17.04+0.68	20) (E-CR 1977)
Pc_r-NFAKIT1 (vim)	2.92 t 0.74	3 96 0.711	433.±000	12 (ECK 1997)

Limology of River Dhepa, Dinajpur

Kazi **mato and** ..**armsful Fei-thaumbi.**
Department **of** Fisheries Management
Halee Mohammad Danes.b. Science anfrechnology Lloilvatsay,. **ifl4put-5200**
zarinstulTbdayatoo.cora

River Dhepa is an offshort of the Karatova-Atrai puri Tista) river originated from ***the*** right-bank of the Atrai near Mohanpur of Dinajpur district The total length of the river is about 40 km. The river has **5:utstands]** impacts on ***the*** ecology and fisheries biodiversity of the surrounding areas. It plays an important role in the regional economy and food security of the Local peopbE

A study on planktonic hiodiversity and their relations'hips with other environmental facture was carried out in Dhepa river from June 2011 to May 2012. Water samples were collected from eight different points of the river during the study period. pilferer!! ph ،sico-chernical characteristics of the river water were found to vary with different study points. From the study. it has shown that Dhepa is very rich in planktonic clivessity. The dominant phytopLankton groups are Chlorophyceae and 13a.cilLarioph.yceae. The dominant species are Pediresinirr sp., **Gta,eoMpg** sp, Fragilarfa sp. and Cksterituis sp. from July **to** October. ft was also observed that during winter, different filamentous algae-Lfrarrix sp... ***5iesiGicfettiu*** sp. end Spfrogyra sp. are mostly common in different parts of Dhapa. river. The average dissolved oxygen content **was** found to vary with a range of 6-.9 to 82 mg per liter.

Present status of this ecosystem is not encouraOng. Rime parts of the river are completely dried up during winter and puts the ecosystem under threat. Moreover, unplanned urban and agricultural developments and the related anthropogenir disturbances predominantly throwing of garbage, discharge of sewage and municipal wastes into water body, unload of sand., overexpLoitation of aquatic resourc s are also reported as increasing problems responsible **for** destroying the overall ecosystem of Dhepa river.

Will marine fish cope with this high CO2 episode?

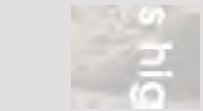
Md. 'Yuma Simko.
Kicict St. 15, 2414) r Gennany
yusLifsarkcrgvahoo.com

Coe

High CO2 and $^{1}{}_{1}4^{1}$**.r iurt-or**

co2 ci.me inc.reaNirigly I.ALto focus.Ii reSeUetieS and Illi•niatiOrlial iltalilL;;`3 **as well over** LIEN **kiecade. Vy'oricl** i„.iiptiohL **mily 6- ilow aware 'hal LPN.. im.reasirkg Level of** 4Lral:L}F,111,L.r): **002** 61 **r of Frrer4rt concern for Ow** i 1;115ility of thi.! rl h, Ii`{ **glob** 71:3 ⁻ 11.1y gi 1 11,AI WaT111111 13. **arid champ-** pre4unt 4t.tliderAatnitog, **today sderd ist5 are I i vig that this was Just zhe of the OD2** probe -:lade **the com munity wøriml. Ilk.** ha) **of the CC:1**$_2$ **problem** W.a. 1.:1-.1..1 the! t',4-ginnIng **of the** arisL. L.•1 11 rw. **Tim** 1]11...711 }**meinoncurrentJv known** ocean ac:LE-.Fii.-.11iim **.;tarted t** di-diee I⁻14 the p4:111114711 MAKTS Cat 4L f•l.* tt is riot Vi'idelly kniiirryi 1:111..}1 091 1:11.. **yet. Oomn acidgioatim -** the **cbar**$_i$**ges** III I the E.LNLIII6.Lry ge_aw.AieLT **in the surf-ace layers of** tin! oce,tri!... 4.1.3.LAAN] by rj **the atmospheule .002, Js rot** her 31.3⁻111. **for c Ii.rnate change or these two i!re not** N;3111 L', 11111 0.111**o. both share** ft1:113510r.-. **cause,** :.I'. *of* **CO2 Lo the** Oce.41;idc.141.1.1waiikm. **often railed** 29 **"the** oi **worming", is.** lif HirrAate Change a1L3 it **poses diffextut** fhltUre 1.5{ InipatIS **o the We kyi La41** .r p.Janet.

The unilillying cause behit .d. ocean arilliEL.,.itloo very 5i,ieri$_2$**)'.1- aril ilii..r•forre.,. iL •rtri. ht. rallt-cl a sinr.111..! prol,Jern arL mospheTn. CO**$_?$ L. IEltaLI v.? Ito` *the* **57.13-ace water 04 i Lx;eark, -0:32 clissoJves in i1 . seawater to form c.arkx.inic acid a-12C0)). arids are very. um...Lillie and convert Loco** Li ms (1-1-9 **Arid b,icarbonitte. ions (I⁻1003** 51111.1' **the lEltki century, we have released rrioep Fuld mote 002 irk the atryli·AphAre grid the** 11...I.N5-1 ?.E'.**gsorbecl greater amour!! nr CCP2 at L•c rua.ric qy ra],id rates which Js much for the ocuarL** N 31;3...otra] **to ackbist to** c.•....n.,11..* **ar, CO.2,** 011.)w **that our ocesfos** rtudy .111160thed in'41 $_{41}$ **i[1**



CO_2 [23 H_2O — Dissolved carbon dioxide — Water

FI_2CO_3 — Carbonic acid

H — Flydrog-ec icrpi

HCO_3 1- Bicarbonatchi

CO2 released by different human activities since *the* beginning of the industrial revolution. As a chemical baLance of the ocean is significantly changing causing too much increase in *the* hydrogen ions (H+) which are ultimately causing the acidity of the water to increase {i.e. decrease in the pH) - the phenomenon named "ocean acidification".

Siroe the origin of this earth, the atmospheric CO2 level has not always teen constant_ This planet has experienced several high CCIii episodes in its history of millions and millions of years_ During those episod, 032 level climbed up and afterwards the level came clown gradually and such changes cccurred over the timescale of thousands of years_ Scientists have suggested a detriments] role of those high CO2 episod.es to contribute to the past mass extinction events - the events when major losses of biodivers4 occurred in Earth's history. At presen4 what worries scientists is the current rate of CO2 rise and eventually the rate of adclification in *the* means_ Current rate of acidification is about 100 times faster than that expuienced by marine ecosystems globally for th,e last 20,000 years_ Therefore, scientist s are worried whether the existing marine comrmun tines would be able to cope with this high 002 episode which is going to occur within just few hundred years compared to the past episodes which occurred over the time span of thousands of years_

How might fish be .affected?

The major changes that would occur in the seawater chemistry due to this acidification include lowering of the pH, an increase in dissolved CO2 and bicarbonate ions (1-100 $^{1-}$) and a decrease in carbonate ions. {CO-. Studies have already reported severe negative effects of ocean acidification for many groups of marine organisms; particularly shell building calcifying organisms (which need carbonate ions for their calcification proems) such as corals, calcareous plankton and algae,. molluscs (oysters,. mussels, clam)., and echinoderms (sea urchins, starfish,. brittle-stars). Compared to other groups of organisms, krbowledge isvery limited on its Likely **direct** *effects* on fish. Diteci. effects on fish could be observed due to the pH change as well as increased. level of CO2 and bicarbonate ions in seawater. Such changes can affect molecular, cellular,. tissue and whole organism functions. Generally, pH reduction can impact physiological process in marine organisms through changing *the* pH of extracelluLar and intracelluLar fluids. But adult fish *are* generally thought to be relatively insensitive to ocean acidification since usually they have effective acid-base regulatory systems compared to most invertebrates. However, early life stages such as eggs and larvae which have not yet fully developed such regulatory functions might be affected_ in adults, increased CO2 would require additional energy expenditure for acid-base repletion which might impact their =ma] growth_

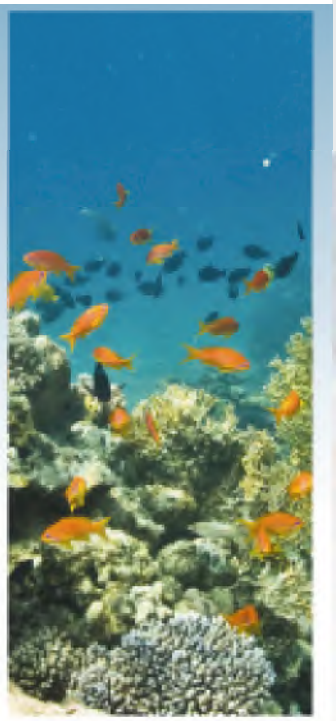
Fish might be affected indirectly as well through the impacts on their ford availability and quality on the food webs or on the organisms they prey upon, e.g. plankton) and habitats they depend on to complete *their* life cycle. It is being predicted that like other shelL-building organisms,. cora1s which also use carbonate ions(CO^3) for building their three dimensional structu rem, would be badly affected due to ocean acidification. Coral reefs are among the most diverse, productive and spectacular eccisysterns on our planet. They offer spawning,. nursery and feeding grounds to many species and thus provide habitat for al least a quarter of all marine speciok Currently. most of the coral reefs all. over the world are already threatened due to bleaching (response of corals to a stress caused by warmer waters), overfishing, destructive fishing and pollution. Ocean acidification, if not controlled, would exacerbate the situation and could destroy all the coral reefs by this century. If reefs disappear, many of the reef associated species would face extinction. Consequently, worldwide reef fisheries which provide 9-12% of the world fish landings might collapse. Furthermore, ocean acidification could 'help increase abundance **of jellyfish** *in the* oceans as the other competitive species will decline giving the jellyfish more *space to* take over This might affect fish since jellyfish are key predators and affect the recruitment of fish population_

at do we know actually 1511 far?

There exist some earlier studies investigating the *effects of* CO2 on fish_ These studies report *that* hyperoapnia - the term used for an increased CO-, level in the blood, affects many physiological **functions** *such* as blood circuJation* respiration,. central nervous system behaviour, metabolism and finally growth. Very high OD2 Marl. kill fish causing cardiac failure_ However, most of the earlier findings reporting the effects **of** hypercapnia on fish cannot be considered relevant for predicting the effects of ocean acidification since those stud ies have been performed under CO2 levels too high to be projected reaListicaLly for *the* future oc$_t$ans Therefore, scientists are not totally clear how marine fish will respond to the levels of acidification that would occur by the end of this century_ Until recently, fisheries scientists assumed that marine Fish would not be under direct threat from acidification in the means since they pos9mis mechanisms that enable them to tolerate high COI concentrations.

Within Last few *years, couple* of studies have been conducted to investigate potential direct *effects* **of** ocean acidification on fish_ The majority of *these* studies have been done by the researchers from the James Cook University in Australia_ The fish species studied so far are mostly coral reef species. In *these* studies, future Levels of CO2 have been found to alter or impair their *activity levels,* brain functions (i.e_ learning ability,. behavioral lateralization) as well as sensory responses such as response to odours, visual cues and auditory response_ N.aturaLLy fish rely on these functions and sensory behaviours to find foads,, select habitat during settlement and to avoid predators and potential risks_ In *case of* Atlantic herring,. increased CO2 was found to *affect metabolism* of embryo s negatively which could reduce the **growth** of the Larvae_ AU these changes observed *particularly* in the early life stages of fish can reduce their individual fitness and could increase their vulnerability to predation which would ultimately affect larval survival and consequently, hamper population replenishment of fish species in a future high CO_2 ocean.

Recently a group of researchers from the Leibniz Institute of Marine Science in Germany has reported detrimental effects of ocean acidification on Atlantic cod - a fish species of high commercial value.



Will marine fish cope with this high CO_2 episode?

In their study, exposure to high 002 resulted in severe lethal tissue damage in many internal organs of the fish larvae. In another study done with an esMarine fish species,. researchers from the Stony Brook University in USA have showed that ocean acidification can severely reduce survival. and growth in. early life stages of this species. These Iwo studies were published in the ilyurrkai Nature Climate. Change in January his year. If results found in these studies airt be generalized to other fish species, the impacts would be much threatening which surely challenges the belief that ocean acidification will not directly affect fish. However, evidences ate still too limited for generalizations' of such effects.

Scientists are predicting that *the* =rine communities and ecosystems will undergo A big change in near future and the future oceans may not be able to support the productive food dirt that we have today. Both directly Arid indirectly marine fisheries and Aquaeultl.tre ihtluStricS All over the world *are at great* risk from future ocean acidification. as we]] as from some other climate related stressors and local impacts sizatultarieously. Scientists are trying to apply geo.engi.neering to red.uoe atmospheric Co_z but still no practical solution exists for us. Until now, the only realistic action the human society can take is to reduce the global CO2 *ernistiore oigaicootly.* In addition to climate change, ocean acidification is a very powerful reason for biking attions sterilise CO ernii *aka* safe level since unlike climate change (which mostly affects the poor countries) must of the major CO2 emitting developed countries would be hardest hit by Wean Atidiftaii1011,

Sharks as a Nutritional Food Supplement

Enornut Hog
B %Ow:WM Fisheries ROtratireh MON to
M vernaningh.22B1
hoq_me@yahoo.com

Shark fishing h3 an important part of marine fish prOduction of Bangladesh arbd most of the artisanal bOat9,111Shing Ilawlers regularly harveS13 Sharlin as targeted or non-targeted cat4h. Catching shark is now a lucrative busing for a large number of coastal fishermen as Shark gkLn, 'nea, fin, teeth 4c hone is eoid at high prices abroad.. Shark meat. whidi hacu been used as fixid Iii coastal areas for thousands years; hag less economically valuable than Oa* fins or *meat* from other more popular pelagic fish **SpeCie5, such es I-ura and SwOrdflAh. 5hark** Meat **CCOTISti Med dried,. salted** Or **VrICIlted in many Asian and African communitie3._ Dried Shark** is **pOprU]ar in Oman and other Gulf countries` [kW and Salted shark meat Is popular es this pre sing rnethOd provides a convenient form in which to transport the product in areas where shelf-life would crtherwise he limited, Shark nwit ccintains op to 2.5% urea and ha$ high nitrogen content in the form of vo[atile how, ammonia and trimethy]atni m It therefore has an implmsani specifilc ciao? and pungent-acid** 143-Ste. A SharkS have **high COntent Of Urea, they shouid he cut and bled Immediately *!IFNI'*** Capt'Ure-

Iii ChineSe CUltUre. the Serving OF Shark fire him Mime to symbolize honer *and* respect. in part INCaU,se it way OfoCe a luxury di-511 that few ootild afford.. Now shark fin soup is widely consuimed around the world. remaining popular specially in Far Fall where it Li al-90 el.k9'1:OlnarilY fl.erued on **special occasion_ in addition to its high nutritional value, shark fin soup IS believed to prOOde people with a range of medicinal benefits_**

Traditionally, shark is 9undried and 1s minilly kept at morn temperature and consumed without any further thermal treatment. Bebre 4;[rying., fmh shark is. filleted, w.a9hed. Lightly salted. and than dried under the min. The procea% 19 not $.ta ridand ig_eicl, 21 O variatkrnS occur In the Salting mg-khad (dry vs. bdrie), Salt COMentratlOrk. S1ge and IJr1-9+11.y f Fish pieces.. and huniadity, temperature. and time of drying.

Proximate and mineral cumipositioa .rpf commoutakark specks of Banglad.r$h cumt

Species.	Proxi[nate composition Origi NOB)			
	Moisture	Ash	Protein	Lipid
Dog shark	32.55	19.211	79.28	0.57
nitwit shirk	41447	19247	78_23	1,13
Hammer head shark	39,45	21-84	78·34	0,30
Shark fin	32.35	36.15	60.0115	0.64
	Mineral cam pusition (ngik$)			
	Na	Ca	Fe	Zn
Dog shark	39,544..69	1,368,76	54.15	12,12
Black shark	45219.84	2261.29	41.87	9..86
HaTrkfrier head shark	43245.60	1,261.20	28.83	8.44
Shark fin.	40,390.83	24,572..71	8163	17,07

Sharks as a Nutritional Food Supplement

Slualene,, found in the liver oil of all sharks.. has ***been*** used in many products, including cosmetics, other health and beauty products ***and*** fuel for street Lamps.. and in the production of vit.amin. A. Sinalerle is an adjuvant that stimulates the immune system and is used in several vaccines.. including some for the HIM *flu* virus, malaria and is being used in clinical trials for hepatitis human papilloana virus and tuberculo6Ls. En addition, shark skin is used as leather, jaws and teeth are sold as souvenirs, dogfish are used as di.ssoction 9pECiMETIES and sharks can be used in fi l I and/ or as fertitizer.

Although shark meat is considered to have a favorable nutritional value, there are nevertheless. certain substances that may be present in shark meat which can have adverse effects on human health.

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Support t42 **nay** ***C*** **[tango Large. Marine Ecosystem (I3DEILM El Project Banglociesh risrhoiti Ricsocech, Irrilituta, Mymensingh**

Prospect of Sea Cucumber Aquaculture

Mc! Arif Chowellwry and Khairuri Yal-iya.
Centre for Marine ancl Coanal Studlin (CEMAC5)
UniveraFtL (551[1]11)
arifidtglyakuNKCOrti

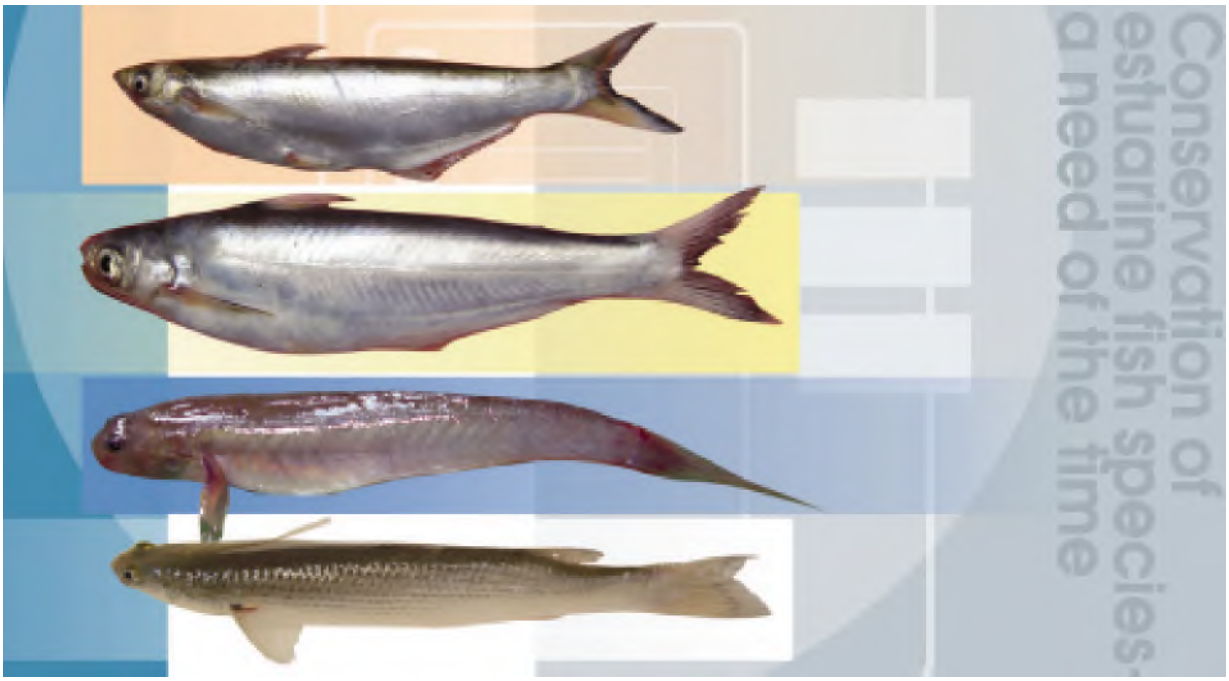
Sea cucumbers are marine animals with leathery skin and elongated body found on the sea floor. Histoe..caliy, sc ut limb= hare been harvested for Chinese consumers for at least 400 years and have been ecuncYrnically important in the western Pacific for VeCT century, Throughout the world, 66 species of sea cucumbers .are commonly in<ploited„ but the must valuable and most well-known are the temperate specks iiposticharrws iorprinic as, commonly knownas Japanese sea curIJ mba, and the tropical species scabrir, commonly known as sanclfish_

Sandfish is greyish-black on the upper side with dark-coloured wrinkles but paler on the underside_ The body i5 cr•al and stout with flattened ends. They arc found in many countries in the Indo-Pacific region. The preferred habitats of sandfish are shallow tropical waters, usually less than 201m deep, such as sheltered areas with high levels of nutrients, including muddy substrata.. sea grass beds and sometimes brackish water. The animals often spend the most part of the clay buried in the muddy sand.

Kingdom: Animal!"
Phylum: Echirbodermate
Jess` Holothuroidea
Order: Asp idochdrolida.
Family Holothuirlidne
Genns2
Spec;. H. s cobra

The total global production (aquaculture and capture) of *sea* cucumber was 15.806.% tonnes to 2010 where 2% was contributed by aquaculture. In terms of monetary value, this likely TCFITCSCIIES an estimated total market of 1, 5,1 billion,. due to the 12u-ge quantity of Japanese sea cucumber produced and the market price for the spedes. In fact, Japanese sea cucumber alone accounts for U,1 billion of the market siZe.

The increasing demand for dried sea cucumber {also known as beche-de-mer), the drastic decline of natural population due to overfishing„ the corresponding. decline of harvests and the high value of sandfish on the market have promoted interest in aquaculture pro.ammes in numerous countries. This aquaculture only limited. with naturally collected. juveniles as hatchery techniques are still not estabhshed.. Hatchery production and aquaculture of smash has been carried out in research-scale since 19 and so far they have shown limited success in India, Madagascar, Vietnam.. Philippines and other South Pacific countries. Establishment of hatchery to produced fry/juveniles are es.sential for expansion of sea cucumber aquacialture

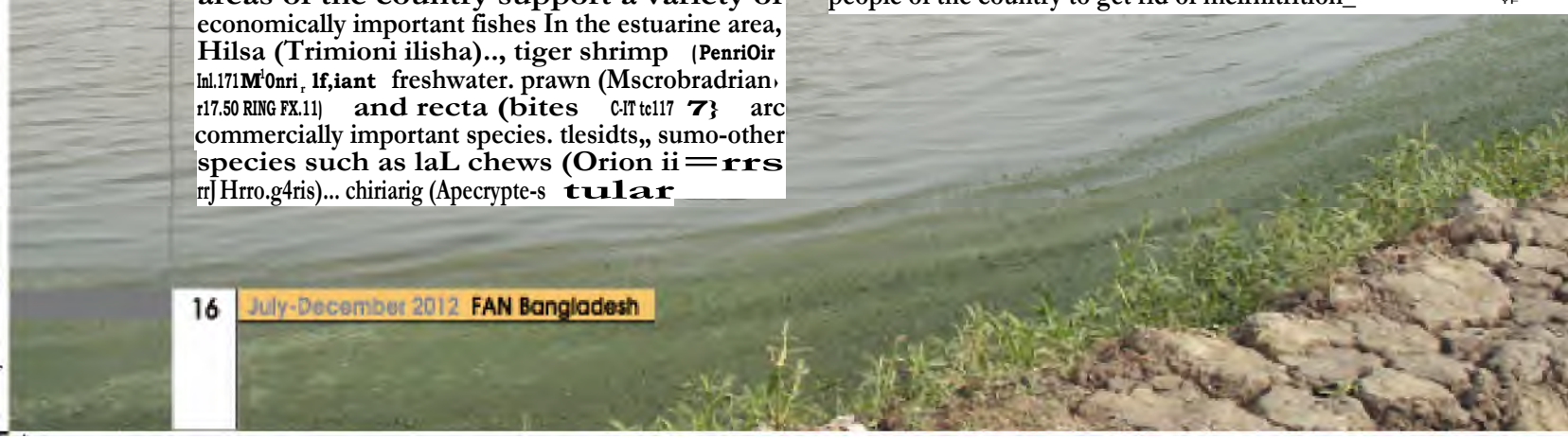


Conservation of estuarine fish species- a need of the time

Mtn Rakeb-th. Wain
Depm littera of Fisheries. & Marine Science
Nwithali Science & Technology University,. Sonapttt. Noaldtall
niipai(et_rstu@yettloo.coni.

The prevalence of malnutrition in Bangladesh is among the highest in the world.. Millions of children and women suffer from one or more forms of malnutrition including low birth weight, wasting. stunt underweig.ht,, vitamin A deficicn.cies, iodine deficiency disorders and anemia. Fish is one of the most imp ortant sources of animal protein and has been widely accepted as a good source of minerals and vitamins. It was observed that small WOLZICS contain high levels of protein, minerals. and vitamins. Particularly mola (ArriNyrrhar yri magy darkina (E,sramds diffircu,$) and la ((s mecca *coal? colic)* contain hig.h levels of vitamin-A. Malnutrition problem of the nation can be effectively reduced by increasing the production of such type of small fish species.

Bangladesh is blessed with an extensive -coastline of about 710 Kin. The estuarine coastal and actacent areas of the country support a variety of economically important fishes In the estuarine area, Hilsa (Trimioni ilisha).., tiger shrimp (PenriOir Inl.171M'Onri, lf,iant freshwater. prawn (Mscrobradrian, r17.50 RING FX.11) and recta (bites C-IT tc117 7} arc commercially important species. tlesidts,, sumo-other species such as laL chews (Orion ii=rrs rrJ Hrro.g4ris)... chiriarig (Apecrypte-s tular *(Si konpinsiz 1nrnijus),* nona Lcrigra *(Mysfas graio),*. va.cha (Errtrorre r m64 silong (Si]onia silondia),, khorol balm (Pinny:fringe cor•sida).. garua (agriscrvia grrrusi).. taposi (Parreurrds pamirscris) and baila (CrlossoOrirds griiris) are commonly availabk fishes in the coastal market of the country_ The price of diesc fish six:cies is relatively lower than those of other fish species like vetki, Indian major carps tilapia and ilish. Hence, the poUT people can easily buy this fish species to meet their nutritional requirement Now-a-clays,, these fishes arc found in various municipal markets of the major cities in the country and the commercial demand is growing throughout the county for their taste and nutritional value. proximate composition of these small fish arc comparable to large carp species, thou price of these fishes are much lower than that Large fish. Therefore,. these fish species play significant role to fulfill the nutrient demand of poor people of the country to get rid of melrnitrition_



PKIVI.1212Lie €C1131134:11311011 **of same estuarine fish species.**

Fish spedes	Mcisturc (%)	Lipid 0[4])	Crude Froiria (%)	AJ3b. OA)	Carbab.ydrote
Dionthicit.slys hacks-	64_20	16.90	15.90	2.40	0.60
Chisaisona pima	79..22	3_25	12,42	5.85	0.24
Sil'orgia littntaria	77_45	532	3 171	2.11	1.41
AtAler).7.10..t *baw*	77,77	°1-CH)	3 5.62	2,41	0.20
Ocloplarlibirro FP DV {:PI MAO	77.43	5_27	15 . 14	2.04	
Rhine:IA.:KO *ccirsid'a*	72,10	5_98	15.00	5.65	1.37
SIR.4.!.gfrio.osi.s piaitiArs	77.60	2-63	1 6.56	2.30	0.70

Fish biodiversity is rapidly idearasing day by day Ln coastal and esti...mine region.. Many fish species *are* **now vulnerable, endangered and critically endangered in coasNi.1 area. The major factors responsible for the losseB of biodiversity are destruction of habitat for nuniery„ feeding and breeding ground of those fish species, overexploitation of biological ttsources, intense population pressure, natural hazards, deforekation, agriculture** *and.* industrial ***pollution*** **and flood control related actvities, However,. resiontion of biodiversity of these valuable specks receivod very little attention from krt11 govern mem and private sector, lks rishuril.!- ::rid aquaculture in Bang1.04.14-1 :SCI! of prime importance in Of bi 'diversity** COrlSerligikkirl, ephrr;53 ff16:1 **se-turity, itionme gur-pratilm,** werhy **employment opportunity,. we shill!! it give proper a Ftention to** ***the*** **conservation aind reNtoraltion of habitat of the estuarine fish** K⁹ ¹E'N

The Checklist of the Riverine Fishes of Bangladesh

Mustafa A.R. Hoseiain, Md, Abdul Wahah and Brn 14cItcm•
Faculty of Fisheries. Bangladesh Agricultural Untyersityr IV ynlensingll- a12
The WorldFisli Center. Bangladesh and South AsL Office, Dhaka
mar hossain@yahco.ccan

The fishes. of lia.nglad.esh exhibit a wonderful cllversity In thelr slge, shapt, colour, habLtar,. feeding habits and heeding behaviour. Considering size /flow,. the are fish such as the rifle Fish which attain only an inch long at maturity and weigh less than a gram., whilst others such as the river shark or goonch reach more than two meters in length and weigh more 11eiri 100 kg, Rangladeiti also possesses splendid, vibrantlycolored fish - queen load] and ether]o 'he and those such as pipe Fishes which look more like a crocrmiile. The male pipe fish provides a]] postgygotlie care of ift offspring by broodkv embryos on its ventral surfaces. while the rice flo.h are thee hearers-

The biodlywsLty of H....T.61 1e fi$11e3 Ls presenily in great danger. Many fishes are either endang.ered or cralloally endangered. Many have already 'rime extinct kiln the waters of Bangladesh. The Red Book of 'rhrea.iened Fishes. of Ranglaide!sh published by the 1LICN-Bangladesh is already more than a dec.adeuld. Acconcling to the Red Wk. 54 lrizilgellarig riverine fishes of Bangladesh are threatened- vulnerable, endangered and crlin.•ally endangerd (1I.JCN-Bangladesh 2CPIX). E I c waver., there have been massive changes In iksh biodiversIty over *the* Last 12 years_ Accorrlini to the survey conducted by the Fish Ntuseu.rn 4c lodiver9ity Centre MA Bangladesh Agricultural University, Mymens" Bangladesh during 2:1(1.51-1(11,. more than 100 riv ..tie fishes are presently under threat and a number of spades are a]ready lost.

At least 295 fish species. from 1 orders and 61 families ate found in the ..Wens, streams, _ponds, ditches.. beels beers, boors , lakes and flocidplains of Rang]adesh_ This Figure lncrudes ±19.hes which normally inhabit estuarine rivers but are also found i.ip.s.tream In fre water rivers. It Ls noteworthy that, among the fish usual]' referred to as freshwater fishes in Bangladesh,. about half can. tolerate macerate salinity (up to ID pet) and often are found in brackish rivers, In addition., anon..}' freshwater fishes aggregate in the nutrient rich areas of river mouth 9 c tiring the monsoon_ This makes It difficult to clistiriguis.h between many freshwater and bractishwater specie& For this reason.. 4ntuarine fishes which move upstream for either short or relative]y]ong distarwes and stay there for severe] days to months without any physiological difficulties are also Included 1:11 Ike List of rIverine. Fcshm.

A number of gobies,. poh•fishes and flatfishes are OtrUghl. ill the River Ivregtina close to Dhaka clty, far from Bay of 'Bengal_ Flatfishes are even. available In the haws of Sunarrigoni in the northeastern part of the country- Though considered a eatkiarine or marine, fishes including Pik.. 't eel, a number of clupeids. pipe I } 1.1.1 gables, sleepers,. poriyfishes„ Flakh.parN. 1.1.1 mad 91..1 01'0 CrOakerS may live In I.ipinlrimn5 In fre3IIINJit.1 ri ors far frilly, coast for long pvricods of time i!u.41 a.re frequently caught In Em. 111enS nets. On the ether horLLI„ fish s-pedes gx•.•rolly 'cons.idered to be

freshwater species including goonch.„ yellowtail catfish. freshwater eels, mud eel.. long whiskered catfish, bagrict catfish, river sprat.. leatherbacks and glassy perchlet are also often found in iituarine rivers.

The riverine fishes; categoi7 and checklist

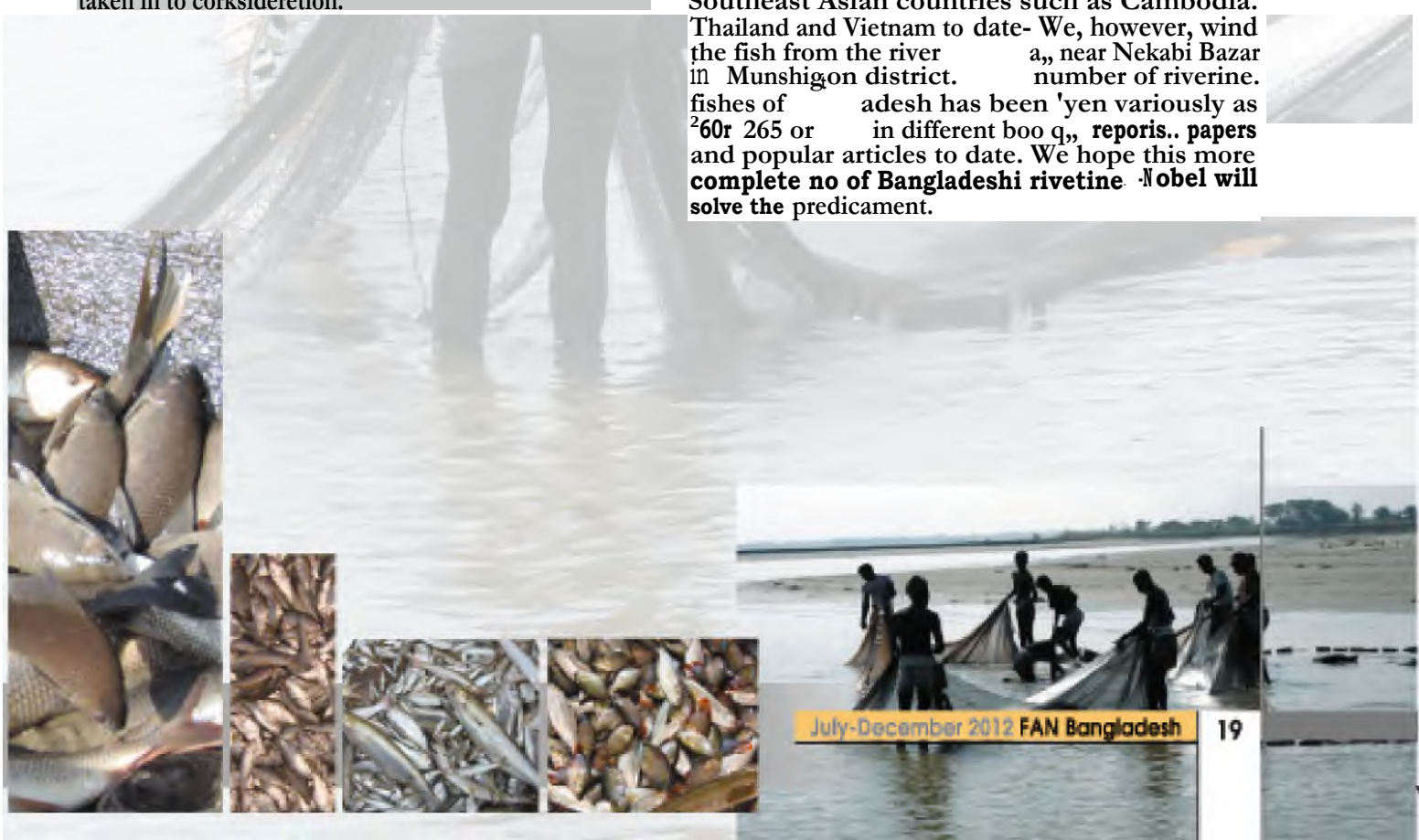
'ihe major groups of riverine .fishes of Bangladesh. include map: carp, minor csirp, barbs, loath, catfish, perch, river shad, snakelvead„ eels, featherback„ anchovies.. OHS fish and mullet. FEL13. et al. 01996.) divided the fishes of Bangladesh. into two categories - small fish.. or mall indigenous peeks of fish (S4-9„ and large fish. According to these authors: the ***fish*** which attain a size of 5 - **25 an** are small fish and all others are large fira SiL10E thE publication of Felts et ats' article, the term SIS has become popular among the scientists.. researchers and policy makers. However, ciaseifica.tion based on this simple definition has created confusions. For example, under this elassific-atinn, many medium sized fishes like- bronze featherback. tank goby, chacunda gizz.ard shad etc. that never grow more than half a mdcr.. MC considered h fall m the name allegory as some **of the** largest fishes like freshwater shark goo nth etc that may glow MOM than 2 muter with weight MOTE than 1a0 kg. On the other hand„ tiny fishes like blue **parr** or flying barb boxcl .grow **to 5 an and wei on a few grams (2-3 g), but** OUnsidared. to fal into some catcgou **as ailics like chrnbin h or bronze learherback which** may reach 2 g or more. To rationalise thi s classification we propose to **divide the riverine and** other inland water fishes of Bangladesh to **4 categuiries** basod. on sizz.

Size-based classification of the rivetine fishes of Bangladesh

Fish type	Tiny fish	Small fah	Medium fish	Large fish
Bangla BUN	Gura machh	Choi° machh	Majhari machh	Pam mac&
Total lungth at maturity cm}	< 5	5 - 15	>15 - 30	>

The rnaldnItirn average weight fyf **FLSh** presently avaiLable in rivers, beeLs, ditches: floodplain, haor and boor, landing ciritem and **fish** markeis wei-e given priority in this clasEtheation rather than the fish weight_9 previously puhlEstbed Ln 1)004, papers and the interact. I lowEver, for fish which are riot yet part of the calertion, published weight!' have beim taken in to corksideretion.

We have hoed 293 fishes in **the checklist of the** riverine fishes of Bangladesh. We believe this is a **complete list of the fish so Far described,.** documented ar SOME sgecies hove never Wore been. ed Ii a cheat t of 13anglades9,i fishes. For example, the croaking gvurami, ***Trichop4,i virfala, halo. only*** been reported Froin Southeast Asian countries such as Cambodia. Thailand and Vietnam to date- We, however, wind the fish from the river a„ near Nekabi Bazar in Munshigon district. number of riverine. fishes of adesh has been 'yen variously as **260r** 265 or in different boo q„ **reporis.. papers** and popular articles to date. We hope this more **complete no of Bangladeshi rivetine Nobel will solve the** predicament.



(' Fie klisi of the riverine tIsli es of Ranglodesh

Order, Aamili1iFurrnes (8 fishes)

	Family	Spleelin	En Liih risme	Berma Li (Law	1. rah	
1	AngtilLidae	Angialla bona 71j ls	Lndian reloUlzdEei	Bancmats	Large	E-k
2	IVIcirinFkrift	aktringifa rizikhora	Rink spughori 170	Ruin	Law	17..R
3	karaommxidie	Catigresak	Yellow Pike Congo		Large	E-R
4		Carigrems lailablariaides	[Thigitl. Pike. C011err	KUM I	Law	••R
5		Miireeme442.14 bag&	Carman Pike Oxiger	MEd La	Large	E-R
	MuraeoldeE	Gyernoshoraz tilt	Iklaray	Baroos	Large	E-R
7	Ophichihidae	PisedmapAis bore	Rice-paddy Eel	Mum	Large	E-R
8		PisodompAis camorktrus	Darien Srirke Eel		Large	E-R
		Orders OcteoglOtifirmal Ct				
9	tforapteridac	airld	CLID w I t LrEEfisb	ChiLoL	LIPP	R-E
1		rf.lp.M71t5	FliTDTEN 1'12;11.11L TtaC	TgLi	fultKligim	
		Orders	Eloglifoneici nolo			
l	mrgalopiring	*Mega* ?cps .eyprorofile	Per.egalopi		Laake	••R
p.		**CWelt1.1 CIE pel fortnet (Li flan)**				
12	C lupria.se	Aomakirairmilwrrea dicerivida	Lkacuziligi Cizzdaii Simi	Mika&	Medan	E-R
13-		Carkg 742) rn	fangvE River Sprit	Kochki	Tiny	R-E
14		Crow prim &num"	Craw& River Guard. SINK!.	Clap Oa	grnsIL	E-P.
15		Gapriesia thorn	River Shad		Smn11	
16		*Ham* keke	Kelm Shad	Cif [fish	Medium	Eli_
37		Nemizipu'ang Jimmy	BlizichsCinzgl.buri	lkirnrig	Medium	F.R
18		Ttaitaleur (Mir	HiLsa Shad	Dish	Large	E-R
19		Terpitaki.,fr *rid!*	IOU Shad	C7iantkin.1 Dish	[-ITV	E-R
20	Eograulidae	CaRa calmsicalier.1	CroLdspatrod Aach.ovy	Olua	Medium	E-R
2L		Co.(k tact' 621•21	Efteriratat Anchovy	Okla	*Mcclintn.*	E-R
2Z		&..rirnirrsi pill:am	CrarigeLic Haimroi Ambn.vy	PLEBE!	Medium	E-R
		Sit.rifArr.ne.i ?My	Sealy Hairfin..Anchery	Teti Pima	Mecham	E-R
24		Thry.52na forrigroali	Eigroiltoor$Thryzu	Rpm Phipa	fuligdi wri	E.R
25		Parysgapairmea	ObLiciir-jaw TbrisEa	Ram Pbaoa	Smell	E-R
25	Priadgasierklae	/IL/ha firlY,geni	CarnmandeL ILiAs	aucrakkha Mau.	Medium	h•R
27		flab aaegalopera	Bigeye Thsha	Chapila	Madam	E-R
		.12.1thu emeLstorritr	hula n. [ULU	Y1/4.1meelbikes.	Hail=	E-R
29		Beikna 4ificipalo	rnel.An eel Innz	Clienddsha	Small	E-R
		Orders Cypdratemei (9 Babel)				
30	Balker:dm:	Acandocyberir	MOLL,' I Aaid:			
31		zonialrermatu	RiVer Loath		SmaR	
32		hreargi	(imp Slane Lrim:h		SreialL	
33		NemAcciiedais shi#10101413			Small	
34		SairJured kapesza	Creek Loath		small	R
35		&Aim-n:1 corky;	Polka De4ted Loath	Moan	Tiny	
36		&MAI:exc.! dayi			Smell	
37		Se-him-rio sirmna.	Half Banded Leach	&WM Khorke	Tiny	R
31t		lediaingiffie	Vicuary Lomb'		Thy	R
	Cnbiricikie	HO2113 dliri.e	Quftn Awli	33cio Mih	!mull	

	FREW'		Englbh Blot	Ban	Ville' 41 &I A	WOW
40		*Botha dayi*	Hera **Loach**	Rani **Matti**	Small	
41		*Bcgia loilltathrSa*	**Lich**	FESO; **klzah**	Small	
42		*&Via Pra* ia	ICifingaicLutich	Etajii **M&Iih**	Sm al	
43		Lep.idacephalichrhys annando	Annandale Lima	*GA=*	Tiny	
44		*Lepidocep.PkVichrOlys berth:m.7.mi*	Runarse Lomb		Small	R
4$		*LepidocephaficAthys puha:A.*	Peppered. Leach	Girrurn	Small	lk-13
46		*yvidocephatichrillys* .1 'ram	IA'kiak Laath	Puiya	Small	R
47		NeW-UClirriricirthys Rtraydriii	Croalpara Lamb		Troy	R
48		fkirvio Aidartger	Java IA=h	Pangal	Small	R
		Rogict parr&	Lamb	NAP	Small	
50		*Somilepras gam sow*	Congo% Linch	Che n Gurum	Small	R
51	Cypintche	*AnpArypligry.ritodon mif f*	fri4vi Caiplft	maa	Smtd]	
$2		A niblypha Dug:lotion 'Aga	Maly Cargiki	Mole	Small	
53		A *spidoparia jays*		Joys	Small	T4
54		A *spidoparia wpm* r		Miami	Si	
33		*Bari0* ius burin	Bari I		Small	
56		BaM &Juba	Orolu. Barb.	Ko.1464	Sinai]	
51		Barafars *bendelAsis*	Hamilton's Barna	Ioiya	trizzlimn	
58		*BilrafJE8* h:i	Shara Batil	Kolaa	Small	
59		&TAW, tae.9	Tile* DIAL	Patbetsbela	Small	
		frarqi+0	Viigr4]3uri]		Small	T4
61		Swain slaw	McgaraslxTa	Abong	Small	
62		Chpirrptigx rhoR pin iv		alagarki	Small	
63		Chet' crick	Silver Market Barb	CPI he]) Cola	Small	B
154		Ore1p Irpo!Trk-ix	lodian Glass Barb	Chhep ChoJa	Small	R-B
65		faraingra bra l'imarrarze risfs		Chimp Cha I a	Small	
66		Sarnosioraa a trances	Silver RazacbciLy Win mow	Chrla	Small	R
67		Salmosriarm *&Ica* tia	LArgc RaurrheLly Minnow		Sanall	R-6
6.8		Sairmostonan pha lo	Pleatale Raw,rheLly Minnow	PI uI Chr-la	Small	It
6SI		*Sal-nwskgrap saRiincrldp*	Sardinella RiEerbeLly Minnow		Small	R
70.		*SeeLIA-leuda gam!*		Ciho ra Chnla	Medium	R
71		*Ciasiathelka !arias*	Gangetic	Kai Elba ta	Sinai I	H-B
72		acrirgao	Nicragisiched Dania.	NiVE;	Small	
73		&title? rerio	zebra Dow	Atkin.		
71		Dei.r.Jrin	Giani Dank	Cbticbli	Small	
75		Diva *rlo anoaraita*			Small	K

	Family	Sfthelm	EAgLiiih	mma	TYPI[2] of 110	Elabhat
		D varla delarka	Sind Dark'	Dthari	Said]	Et
77		Esamas dafttl'eas	F13'ing Bark	bark ma	gll1311	R-E
78		Esomws lineagus	Surip::d Flying Barb	bar Iona		R-E
79		*Rayborer eicanicamila*	Synder Rasbora	Darkka	Small	k-E
80		*Rasbora eas bora*	(langedc Seimnriail Rag bora	Likma.	Small	R-E
81		Carta me t	Annandale Garra	Glicirpoiya	Small	
82		(terra zatyla	Sucker Hcad	Gbarpoiya	Small	R
83		C Accri *cada*	Cad	Ila	I·*TP	R-E
		Cinthistia fkrigititt	Mrigid	MAXI.	Large	R-E
85		Orth ftdrs Yeba	Reba carp	Rick	hfrdiurm	It
gh		Lahm =gra		Ramp Rai		R
87		Ltheo ar4a	144W.	Reba	MDR=	Et
158		Lainv Orrla	Bala	Bala	Lane	Et
89		*Labeo baga*		Shangon	3plodikim.	Et
90		14A'fren &maw:			McAium	E-L.
9I		*Lave* calliasu	Orals -tin Labee	Kabftr GS	Large	Et
92		Lab.eo der"	Kalabans	KIIM1	Ziplcdium	
93		Li'Oro dyvt'frr		(-41[4],14 Machh	Large	Et
9		F.rr healumulariatus	Fringed-ILppad Carp		Large	
9		Laken gam Ws	Kuria Laliesa		J.sige	
iNS		LiLbgi>	Malta. Ltbael	Karldina	LargL	
97		*Label" pongaria*		ES riSkn	tar	Et
98		*Label" rohim*	Rchul	Rui	Lind	R-E
99		Tvr prAgigora	Puaitor Hamar		Large	
LOU		Tor for	Maliactr	litelelba_dieer	Large	
1 I		PieciibsciehJial	Capper Makteer			
		Yte_loggaical vis				R
1C12		Oreichrito ctnarimb	Kostinti Barb	KersuW L	Small	Et
103		P. ierkrecasa cd.qfp		phels	Small	
104		*ageochigus*	SLIvcf Sharkbkiabaw		Modikim	
105		*Amid*	Swamp Barb	Chola Nati	Small	
106		carachattha	RV SY Bub	Kanchoo Punt]	Small	
L07		*Prvitiros getrlies*	Cro]ckfi Barb	IeLi %MA	Tiny	
LOS		Pradirm *wank'*	Clam Barb	Male Nod	Small	
1.119		Pbulrims phArlorio	Spattedtail Barb	Ptartani Pund	Small	R
110		EELS ifig>tritt	Emilio Bulb	Nod	Small	R
111		Familia *MUM,*	Oliwe Barb	Sat Pula;	Large	R-E
L I Z		PuMixti RelrthareI	poll Nib	BMA ?mai	Mrxliam	R
113		.Palaribis *redo*	Onmpoi Barb		Sma]]	Ft
1.14		.Plitatiras *ticro*	Tscuo Bari).	Fualti		
L15		iltuicanazu lbolECA	Tmue Bath	Bhol	Large	R
116		Roiamers irratraw	Bum sc Trout	BboL	2'pic:diam.	
117	Pszikah.yricbillfe	*Psitarhymehas bantam*	Balilata Minnow	%Mora	Small	Et
11I5		PILiothrichia *grtrc rlls*	RElibheu Mlrrrrou	Barmegra	Small	Et
119		Pail/Awl *duds ra* {Min			Sma]]	Et
120		Psarprhypxkiri suaci.rp	River Swpft Carp	Than	Small	81
		Order, Silwigwams p9 fishes)				
121	thadbbrcipiLiclor	A nroWyreps ludiceps	Indian 'Forrem.CatriEb		Small	
122		A nrchlycepx Krear29ko es	Turruni CMfish		Small	El
123	Ariidac	A rirod *;a/Ora*	Engraved Ca tEis b		Law	E R

	Family	Swim	EngWI aline	&rigidJi liarRt	Inic nth	Balpitai
124		Nemap re ry_1‘ wawa	Thidiz pined Ca tE ski	IGarn	Lorgu	E R
12,1		Airmapkrcrpr n Mgr	r. Epra rmtEsli	GaBla	Medi um	
126		&TIM diacepirolue mirto	&at& 5c.s Carib h	Kau bukha	Medium	E-R
127		*Osllrogerleiamis nritiiaris*	guldxf Cameo	AiwiYa	Large	ER
328	Baji.fulaa	*Bards i6 betnasko*		Tend	Small	
129		*Iftgasi:o Arergana*		Tcrigra	Snail	R
130		*BrefoiJkickg* Ptre.riudi2	Mer•xla catfish	CPIL^{2}4^{2}	‘ale	
]3]		ibi^{4}Y^{614,3} raw^{4145}	Raab. My MN	TCagra	Medium	R•E
132		srus *'Week* ri	Day's Mysiw	Gala Musrs	Md, urn	
333		Mpitro cg›quiay	LlangUlic Alpha	Kabuxi 1:e Eva	Medium	R F.
334		*Mrs* tia ge4110	Long Whiskers. (12Ifith.	Mirka	Large	
133		.ierynws .rertgara	Pyjarlia Catra.kis	Teagra n Kra		
336		*ibfys* r au Waal =	Striped. ElprarECatfish	Thum	Medium	R F;.
137		Raasa chartdrantern	Fillbutkrighed Cs ull	Gun! Tengra	Small	
138			ll	Ruin	Large	R•E
339		*Spetaut zwe-*	ions Whi5Leted t21.11ah.	Air	Larr	R-E:
3413		*Spergarr warghata*	Maul River clalfish	Gab= Air	LarEr	IC-E
141	Chscildsc	atom cit.:rya	Riugrekend di	Clarks	Medi	
]12	Clutiidsis	Cia rime b.rareceiner	*Walking* Catlich	Maw	Medium	R-E
143	Epee! isti dac	COMM! *CIAILI*	Canto. C-affish	Ku Lqlk	Sisal!	
144		ErFrhrs Les *pariJ* tier		Kii La	Tiny	Ft
145		LagilLeicl		1{3:11i Thagra	Tiny	
146		Log	Faioice Cot6sh	Tend	Small	
117	HecarNetUELLtle	*ileeempteiateurderifis*	Catfish	Shift	Medium	R-E
148	O Lyridse	Olyrrr *tempi*			Medium	k
119	Parkgilkciki ILI		CatkFh	PUPS	Large	R•E
3501	S I¢hridac	*PlOftlirts canius*	Gray ELI Cpt6 s h	NI igre	Large	
151	S Ube idas	Ailia rtiorla	Caul getic JLilia	KajiAi	&mill	R-E
152.		ppalcrcarts	Lams	Fr*oli	Smith	R-E
153		Clap *isorria gania*	CIarub Val:ha	Gh[ma	Laq0	k-E
154		*Eutropfichlw* tvpwniats	t1(mi us Vuth	Kill Beck'	Meauen.	Ft
155		Eatiopiichalrp vac ha	BuL-Fiwa V•dia	duLhial	Largo	R•E
156		p. wieiri *arheririaMeq*	Indian Poird		Small	R-E
157		SikuPia Si hAmdia	(lata5h	Shilonrg	Large	R-E
] 58	S. ilu ridas	*°Aga bilminkvinfur*	Butte Cash	Kann Pah&	Large	R-E
359		*&Nara patmia*	Pablah CalfiNh	Pakli	Medium	
160		*atipaik pabo*	hbzi Cadlab	Pubda	Medium	
161		PP rpr rypitis *gangefien*			rtiedi urn	
362		Miaow arta	Fripkwalor Shut	B041]	Larg's	k-E
163	&scribe	gagarirts .!Rucrrim	Derl Gro nab	Baghair	LAW	R-6
164		Bagaries yarrerti	Gconeb		LarP	R-E
365		Cagard t rtia	CICA411 Cut%	Gain Ter gra	Medi	R-E
166		*Cragezta* Mara	Yellow *DTA Ittvill5i	Gag Raga	Medium	R-E

	Family	Speclei	Er2IM. manic	N42 [IIK	Tia Kir	Habitat
167		Gemara' mom 0	Lodi meta	Clang Tengra	5ida11	R E
IR		Gogangra ltiriderc ens	1-Fild'lah Nin	rjarig'icil.gra.	Small	k E
169		anikg	Sisixid Torrent ash	Te:	Mtdi.Uni	R
170		Cringehel ma rekfuitia	Sisccid Torrtnc	Magus	Sill	
171		Ark KInd)			Small	R.
172		Gl spacithorax AFr. (lap.]Rivet)			Small	
173		!faro kani	1dc01 r.alffiati	Knrakanb	Sir idI	
174		Haufelnimi	Asian Moan C23ifixli	Kulakanti	Tiro	
175		Arang.nsi Etaccailenta		trairkngre	"Gay	
176		Yawn Nowa		CsigTengra	Tiny	
177		Maw ornearn		(=rang Tengra	Tray	
178		Plemdethemif Jaair_ar.2	Sucker TIrmal Ca1115:1		"Goy	
179		naidelsilwrsrs	Velii Mai! Carl' ch	Chen=	3irlerlium.	B.
		Order ; Cyprincgiomlifermies (.1				
		fbeheth.d ;DArh. 444	14 dr: Pl ¯c ¯13.11	K;ipcnd	Tiny	R L
		Ortieq SynWnuthErorEk11 (3 rkiheo)				
181	Syrrign alhorlae	khnliyisa nos ad ree	¯mhvazr	Kumirer Khil	Small	R I
182		.1.ficrephIr chwcatu•	erocimiileAdwrlh NEB!' h	Umbel Ithil	Small	B. E
183		Alk.ropJaq deomp	PipqfiE.13	Kumircr KM	Stroll	R E
		ardErs, Synlaranchifiirma. &lbw				
184	Synlararichillac	Homy, *ferres* rau#6.1	14.11KIEcl.	Kuchia	Larr	R E
185		Of..Oun'ernon bErrtureare	Ben gal Er]	Barrios	Large	R E
186	Mruhicernbelirlae	n<4gtGP PIILfantiarcs	ZIg EJ	BniTri	1 arV	R E
187		MgCeNriwarkia 41C.144445	1.AE-ser Spiny Ed	Tara Balm	Medium	R E
1815		Macrogrixahres arm'	One.%trirle S1AD3'ee	Tans rim	Medium.	R F.
1K9			lEkarroJ Spiny Eel	Gadd		R E
		Ordnr a Pirciflocaxi (157 flakes)				
190	Ain tx:w I LH:	enbarris ripaug	Scull-Ted Pe ralet	Naltka Chandn	5ina16	R E
191		Clicus dm mum	1111:01 E ale OW PERE El	Own.%	Small	R E
192		rarthavris ramps!	Indian GIrmy FiEh	•anga. Clianda	Small	R E
193		Bartirriusge ruki	High% Crkwy Pcrchlet	(-01 ChArkia	Tiny	R
194		PzcialatnoltAsi4 &lab	Himalayan Glassy Ferchler	PiciPo Chan&	T]my	RE
195	Analmariklae	.Anedbar	Gangetic Kai	Fled		
196		=has itmrdirLaus	Climbing Perch	KiI	Modem	
197	114cliche	Br.m.Gr rawer!	Bhic Pcmb	.Nagrit	"Goy	bd
198		Balsa driffirawng	Alva PCE			B.
199	Centrciorniliac	Ler& aka	Giant Path.	Maki	Urge	
2.00	Channidm	Cktrtrva 61119:41	Rama Snakettrad	Plida	Large	

	Fenny	Spiccin	Intik mac	Bengali name	Type of fish	
201		Chaigriti *ganrilia*	Dyne Snalichead	Ching	Medium	
202		Manna grear/JJELer	Cp.rvic Snake:brad	CTOjilif	Urge	• R
203		Grimm/ arie n *gag&*	WalLincs S nu/Await	AO	Medium	Ik
204		*Chatirta* "1'k-rata	Spailcd S calchend	Tali	Medium	
205		Manna Sgrrigni	Staid kail Morel	Shot	Large	E R
206	Dal nig idiEl.14	Darnioides poitafic	FrAir.haridai Ilse rR di	Real	Medium	R
207		JT eLY	Doc LID111 Slaw	Kull	Small	E K
20		Brads *me knosl'igma*	B lark..3 pa ilea Gilds boo	KO° Ds&	delfizii:=11	E
209		*&learnt Aiwa*	NiEb Sktru	Mut Bails	Medium	
210		*1E4.4704.5 laigeol*	Lid S.leapeC		Small	L
2] 1	Crinti I mile	*Ac* enhvgoiltikis cami	Trapi i I S and crab y		Small	R
212		ACErart weAris cyaraunaus		Num	Small	E
213		*ramsottiros*	Spaued Green Gcihy	NuI Bala	Small	R
		Lel F A, Wield tla				
214		A Thar n.re 121700		]tali Ghee	Medium	E R
215		*AW00444 grartimepormus*	Scrilablcd Coby	mit	Surial	E R
216		Alumna *Hirlarrinubr*	Goby	Rriln		E R
217		Baeciplri.Ftia Imam eveintani	CAngle-eyed aby	Dank.	Small	E R
218		*Bruchykobiaw maws*	~~Burnblelass Coby~~	NUM Balla	Thy	E R
219		*Eit,4ica-rhniv#446 ariF,441ty*	Gaby		nrry	E R
220		*Gkvsogai'*	Tank Clotly	Bt Le	Medium	E R
2.21		Gobliarsit rtlige.ffigkhloa	I .grkijagr GOT	Oman Bele	Small	E R
222		Crobiopterai.5 *drum'*	Casa Goby	Raja Chew o.	nrry	E R
223		*Odatkranitblyivda netirmirrilms*	Rulfirurnlos Be ! play	.Nuna 15aila	Medium	E R
224		.atieralepia	Maned Gobi;	'Dan Chew u.	Small	E R
2.25		PiA Mprcruptirj bgraideS		NM&	Medium	E R
2.26		Ferriage; **abandon eidosle.W*	Dunk Mud; r v r	Izanuk two	Medium	E R
227		PErie.ipiartedirnau ;NJ rIlla n.er	Mantic Mudskipper	Thaw&	Small	E R
ng		*[42]3ermigipoe rypres edarrgaiiis*	Poi riled · tailed Cob)	Raja Cliewa	Medium	• R
229		*Scarrelaos .ritsropitorus*	Walking Crab).	&Mb aggo	Small	E R
230		*Srill=4 itif*	S	DiNoC.haada	Salad	E R
23]		*Trisraciaks*	cr hyvgl	T'alc Chair	Merlium	E R
232		Thenioides *eOrratite*	Brarderl EL Goby	Thad; ellarhfa	Medium	• R
233		r.ryp eil Maid 61	B =mein Roby	Tak ['hands	Medium	E R
234		Go= siirruln	PIAVE&	'Ilk Chu&	Small	R
235		StEtri00 AtietA	pis roux' PorTYfi0	Samuda Koi	Small	E R
16		Seralor	S bad orb:aro:3i PeayElati	Hu la		E R
2.37		*Lein Ni Jrus biters*	OranEe!inneE rcire3-541	Rata	Small	E Jd
23$1.		*Letognarhus egera WS'*	Greuer Pr.:171m	%la	Small	F. R
239	Lai:14141(.14e	*Latvres sairinamerisis*		Baia	Large	F. R
240	relvolviat	*Liga puma&*	Pi mp:I-n.11164:4 Maki	Pane	Medium	

	Family	Species	English name	Drogeli risme	Type of fish	Habitat
241		*Liza parsia*	Gold-spot Mullet	Pars*	Small	E R
242		*Liza subviridis*	Greenback Mullet	data	Large	E R
243		*Mugil cephalus*	Striped Mullet	Bhangcc Pan	Large	E R
244		i.'30.411518 mink	C'.0t3illa. Mullet	K.horiula.	Large	E
245		ca.Trosig	Yellowtail lipluLlet	Hach ki Bina	5m31]	R
246	hlahIklie	I'Vered-u; rrOrreIN'	GEM gelk Wei	Rhoda	Small	RE
247	Cisphr-earnidee	*ColEva* aunt+	1-[c [ley Gouratui	1 h Lida Kholisa	'rimy	
24B		*Casa* fti3e4are	Bnrrclad CKinami	K.bolisa	Small	
249		Cati&ci tabicde	Tbiok-Ilppod Couranal.		Small	R
250		Colima raltia	Dwarf Gourami	Lai Echaii.a	Small	R
251		Ctea.opi nyibihr	Frail Gouraud		Small	R
252		Psytrapsprifataer444	Spike:lad Thiadimilabi	Kai	Small	R E
253		Tricirsquair vault'	Croaking Eickezard.		Simi]	R
254	Maur ephelidm	Platir.ephalles	Curtail IT ailhami		Large	R
255	PalynamiLlae	Erlitral'Fe rtiaeina rarariaeryJw#1	Emir Finger Thmdfiri	Taiin	LArge	ER
Z56		Lepromidamm21142J irroficeurr	IadinTaifteInilL	Latium.	Large	LR
257		F1-,Eydlad-.a.4m Lar.f2E;	SixIinger IImeadfin	Tails	Large	ER
256		J ay menus puravie	PITA E4 ThrrArE FL	Tar,-Kh:	Pig Minn	1: R
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LATERALITY IN FORAGIN(BEHAVIOR OF TI ITTI FFISI SEPIA INCICV '

Nahid Sultana Lucky
Faculty of Fisheries, Bangladesh Agricultural University, Mymensingh-2202
nahidlucky@yahoo.com

Lai lily has TIOW been well known in vertebrate species. It him been suggefted that the structural and functional :superiority of one aide of the body, especially the brain, over the other are involved m several lateral behaviors, such as„ foraMng behavior, agonistic re.9ponse, or escape behavior in vertebrates. laterality has been present ak the population level when moat of the individuaL9. in a population became specialized for a particular side. Le. population biased either to the qht or left. Individual laterality found when individuals showed half right and Left Maned in a population.

Recently, it hay been revealed that many fish exhibit lateral dimorphism in foraging behavior,. every populaticin studied has been composed *of* belle types of tndlviclua Li: a left-dominant {called lefties) and a right-dorniruant (righdes). The lateral dinirrphksm of fig es seems to be maintained by frequency-dependent natural selection through predominance of crats-predation with its prey. In thLl flys-tern when there in more righly predator than le ones. Lefty prey 1151 more exploited.. because the prey is poorer at dadgi% the attack. of deity ator than lefty pra.a.tor. As a FErlkiit.. ilg7y prey may increase Ina popuLation, which uitimately leading to an increase of (thy predator tha.n.righty ones,

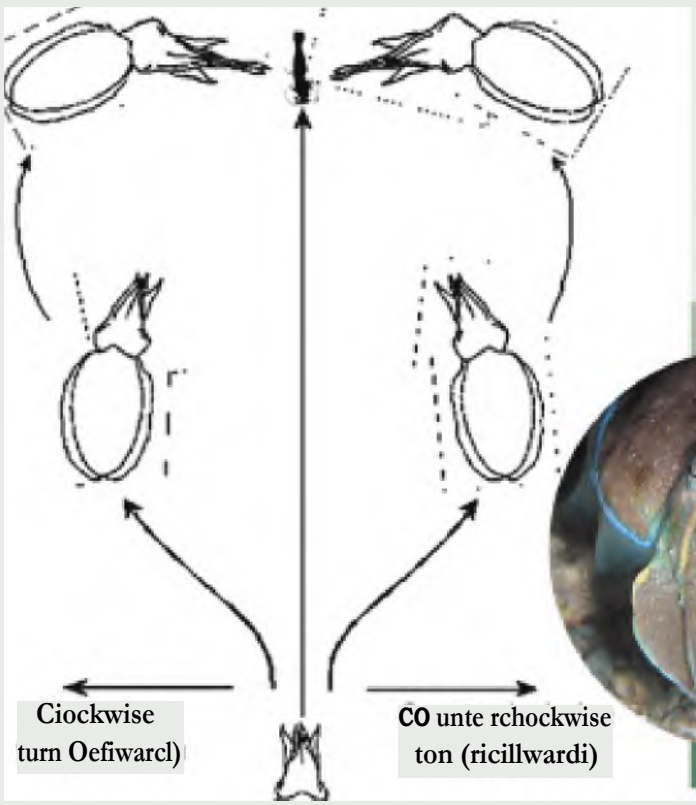
In invertebrates, very rew eicarnplin on laterality have been re ported so far, bet recently increasing interest has been found in thi.9 topic (Tabu et 3 2012). In cephalopods, OcXcpris znagaris showed lateral dimorphism in eye use_ 11 1.+1.13:9 predicted that this lateral foraging behavior of each Individual of a vulgaris may be advantageous for the ealfhing of prey. Another woup of cephalopeds, cuttlefish. aL90 shows a lateralized behavior in approaching prey and other situatiorel. When juvenile of European common cuttlefish. *Sepia offiditalia,* attempt to attack a crab, they avoid the c LBWS. by erhimming above the crab and turning around rightward or Leftward to a. ach it from 'behind, Mamie inclivicLuaL bias of the turning direction has not been documented for thiLi foraging behavior.

The present study demonstrates that the cuttlefish individuals *have* a left or right behavioral bias during their capture of a prey shrimp. The subject was kisslip cuttlefL9h. Septa rycidim Gray 1849, a common arid a large-sized (VI cm adult mantle size)

common. and a large-:sized .(38 an adult mantle size univoltine cuttlefislo. found in littoral areas Japan and Southcast Asia,, which is available for rearin.g under laboratory conditions.

Poe behavior was observed in an arena (a s9uarc s tank. 3.70x40C x100 mm depth) using a tal video camera.. The arena was filled with fil Ted seawater of 5 an depth,. and the bottom. was COVerexi with a 20 mm layer oaf fine Rind to allow the subject individuals to hide themselves. In the behavicoral tests yourag (body length 2 to 3 cm) palaemonid shrimp.. P.1;56.lqt-4l5r was used as prey. In each trial, a shrimp was attached to a needle with a king shaft and wax manual presented to the Fabled .cutdefish so the su and shrimp were positioned face to face and at .ast 10 cm apart from each other. When the cuttlefish noticed the shrimp being presented face to face, it began to swim slowly and directly toward the shrimp. When reaching a distance of two to throe times its body length from the prey, the cuttlefish begun to turn rightward or lettwara.. The cuttlefish then continued to hurl while keeping its 1read toward the prey (watching the target with both e_yes),, raising its snots irp and eventually raising the body upwaa d. It then took a position to the side, or sometimes diagonally, behind the prey, stretched its tentacles downward and held the abdomen of the prey, and c ed. the pre' by jumping on it. This pracoss too three to tour seconds horn the start of to the capture of the target. Thirty attacks tow the prey were recorded for each subject cuttlefish. The maximum recording time was 5 min fur each observation.

Of the 35 young cuttlefish examined, 14 cahibiltd 5izrtificant bias for clockwise (leftward) and 14 for counterclockwise (rightward) turning in foraging behavior (chi-scruare test, p<0.0.5). Moreover, the distribution pkattern of index of behavioral laterality was bimodal, with a few 4Dereptional individ.uah turning both rightward and leftward evenly. Thus, it can be said that the cuttldish shows behavioral dimorphism in its hunting of shrimp. Behavioral hism has also been found. in tests examining ruffle behavior in turning into a T-maze and in eye use by octopuses wake stil*cts.. The study confirms that cephalopods exhibitlaterality in their foraging behavior.



Parasite corner: Spot check!

A.P. Shinn
Institute of Aquaculture, University of Stirling, Stirling, FK9 4LA, UK
aps1@stir.ac.uk

thus.c that **Crianagd** fish, **whether it be kirrior•pr7;4119, wild fisheries or captive held, cemri men•L.-illy reared. stock., the a nee of white spots oft the** body **SI. trface of fres= fish species are on unwelcome sight. These 'spots" are the par-mitic sine or truptionts of the ciliate protozoon ichthyophthirius multifiliis which, if left untreated, can cause skubstantied mortality in freshwater fish populations.**

Commordy known as "7th", 'Itch" or plain old Pwhitespoti„ f. *rnith.iftrii3* has a low **host specificity and can** infect all known freshwater fig h species **from the *erode to the*** tropics. This **paeasIte *tilted wtikh* is temperature dependent such that** the wanner the water temperature the **taster the life-cycle completes. The lite-cycle comprigm five** stagir. a parasitic trophont (1) that sits within **the hoses** epidermis,. an **exiting, free-**swimming **protumont stage** (2) that settles on **the substrate to become an ens rred. formicrat** (3)- Within the tornacyst, the parasite undergoes division to produce between 50-3001) torniies (.4 _ The tornite**S are then released and subsequently differentiae into infective free swimming** theronts (5) which most **find a host within a short window of** ti**me to successtally complete the life-cycle by** pen.etrating the eppi s and deveLoping into **the trophent stage.** Host **pathology occtirs *when a* sigrtificarit number of large, mature** parailitetp, whirch can measure up to 1 min **in diameter, exit the fish** causing respiratory stress and osmoregulatory dysfunction_ High numbers exiting the gills of smaller sired fish **rftzLy rE*olt Ln the direct** mortality **of fish. For thow that** do survive, they ***we*** c 10 secondary bacterial or water mould [in Lions that may increase the Jikeliho mortality_ Given the rapid rate of parasite prodder40R. which can increase sewer al thotisarbd-**fold with each infection cycle. *the 0.1Viegi ranee* of F.** multiifiliis trophonts on fish stock cannot be ignored and must be managed_

There are., however, relatively few effective control strategies **for the t oof** f. **rnalitiiiis** trifenons in farm„ **or open systems_ The** parasitic Lrophont stage is **protected lying** rznderneath the **host surface epithelium whilst the tornocyst is protected by a resistant coat and as such, gilft rarely susceptible to treatment. The free-Elvin protornont is a. shmt•lived stage and the window for treatment is** narrow (O. few minutes to 3 **hours). The theront stige, howe'„er,** can si.a'vive for up to *92* h at low water temperatures in which it **EYNIIISt infect a host** or ***die from*** &picked enery rest-rvesi. th4fir s.o ival heir inverhely21'_rOiXortional to **the arn.bient water temperature. Historically, malactikte .41reen** wars commonly **used for the corral of I. nilatifil hzi and a range of other fish** 4;(iScrcStS due to its demonstraNe ***chicane,*** however, its **potential harmful implicts upon. human health led to its um in food fish being banned by** many **countrit% worldwide. The most commonly used approaches are 1) the** use Of **short, daily bath treatments of 30 min-4 h fora period of** It days irl .arks **or flow-systems,. or.. 2) the use of a long. 7.15 clap in-ba duration tregarnent in pond cultuu•e,. witia Uarget the free-swimming stages of the parasite ti,e, protorrionts and theronts)** only. **This approach** atterruptS to rnanaKe infections by reducing **the number of parasites m the water coll.kmn that would otherwise infect fish.**

Current treatments include the use of formaldehyde, sodium Chloride (salt), copper sulphate and potassium perrunganate.. however, a trurribtr of more covitoruntidally **friendly drugi.** are 110W under consideration **(e.g.** brOrk:1*.nd at ***range of eemt'etic acid-based products). T*** treatMcnt reguntl have **been comprehensively reviewed** in a **recent** aecOlant by Picon-Cammcho **and colleagues (2012.. Parasitology, 139, 1494 4 Whilst *a* number of** ripon-clkemical strategies **for the control of I. louiltifiliis have been em;plosed including increases in temperature (above 31WQ and in** water flow tates„ water filtration and rarechanical removal of cysts from **the bottom of culture system, each method** has its drawbacks. **For the present rmyriy of these approaches are limited to tank anal '·otchery snturns anti. we must wait for the dews" prrent of** eth.ctive management strategies for use in **pond and Large-scale** open **water** systems,

Family of Fisheries liajee Mohammad Danesh Science & Technology University, Dinajpur

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Faculty of Fl series
Hajee Mohammad Danesh Science & Technolny L.fnivers14. Dinah=

HaFee **Mohammad Darieh Science .itc Technology Unk.Y..rsity (H5TU) ia the** firNI **&Aimee and** Tt9 **Imobgy University in the nikrEhtfrri region of** HST 11 **has been establisheil in 1999,** lor.„L,91 **in the northern side of Dinajpur district_ Rind Ey of Fishenoq of H5TILI is the only institute of hig:ier education in fisheries in the northwest part of the country. The facility has started ills Journey since 20015** r I **hiparIrriti** Risheries Biology **gad Geraïk6.,** ALLuac •311h1rt', Management, **and Fisheries Technoti.ly. The faculty** gristiS to **be a centre of excellence for fisherieS education** resekrch **and to produce scholars for the ooturny's economic development.**

Facility of FisheriPs in HSTU is contributLng in fisheries secierr if r'iwthwelt roe **of 13angladesh, There. are** mirm•rDLIN **ilsheries resources in the region, and the research and. education of the faculty can flourish their exploitation and better management. To date Faculty of Fisheries has succftsfully completed a number of researches on fish biodiversity of Northwest 15a.rigLadfth** r **Landmark used shape analysis of** •irrhirm$ Yaw **from different stocks** r **climate than Eroi impact on Fisheries. lit thologIcal study on Pnr.;!rithava and Dherta river funded by differ.-,: niitonal and international organi2ations. Clirwlilly some restsuch projects on 515 and Til ;pia farming in the northwest put of trangladesh are goning on in Faculty funded by Mirdstry of Science and InormatIon .& Communication Technology and the University Grant Commission_**

The mission of the FiNclilty 14 Fisheries HSTU is to produce ocitscantinly, irlit.:rn4tionaLly accredited. graduates in the hold.. of fisheries who are IntlefflatiVe, **of life-Jong** liqrmi:r.g and ric.. Mr;11. **the faculty are committed to cLynimunity** NI'rVie •10 ernNerVe Main] enVirOfirnerlit by •i riEnbl i I i l'l E to **the management, prokell.rm, Artti ..:JNI.iinikble resources** i ',or: h **;WI Of** Bar. **Oadeshihrough Lea,** a;ILF ret,e, rch. The Fat when-, of

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PRACTICAL ACTION

PleilKii.; .11 Actioo, House *12,rEl Road *4
nrri41:1r11 R/A,. Dhaka. • 1209, Irangladesh

Local Knowledge Centre (Gyaner Haat): experience of Practical Action on operational model

Frauk-U1-Islam, Saikat Shubra Airh,
Kamrul Islam Bhuiyan and A.M. 5amsuddula
laruLislairiElpracticalactionorgbd

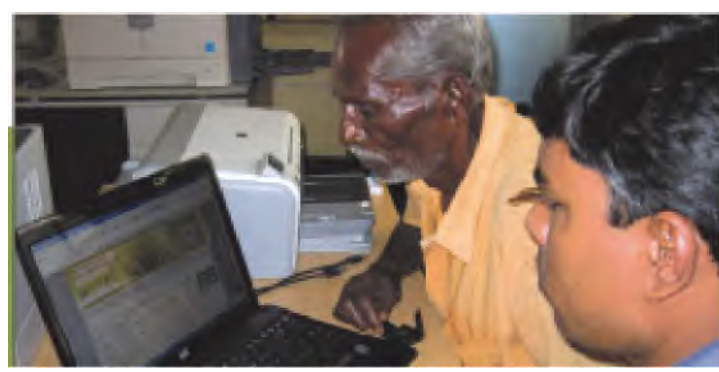
Decentralsied knowledge service is vita] for empowering the knowledge deprived poor people. Practical Action's knowledge management programme is more about creathig the provision of ccFritoctualised. and localised knowledgelor die poor communities and developing a channel of reliable information and knowledge from the grassroot to policy makers about real needs for technical assistance in poverty reduction prioFam. Aiming. to create diverse entities for clecentraisiect knowledge sec ice Practical Action 1:kangladesh promotes grassroot Knowledge Centre in various locations called Cyaner Haat. 'Rased on its experience on working with rural technolog extensionist for 101 years,, rural ICI' or technology centre for 4-5 years and farmers technical uiry senrice for many yeara, Practical Action ada :..... a model of grasEroot knowl. ... centre attar d with NG0s, Union Couricils and High &hods over last 3 years. This account describes experiences on operalional model of knowledge centre from several Pracftal Action projects and one an going adion research

With yarning start-up investment cost (2-1CI lakiks),._ a centre can run by its own if it earns 1.0.0.10-15.411001 taka per month. One cif the unique character of the CelltFE is its local expert pool of around 20 self-employed rural technology extengsionists linked with one self-employed knowledge entrepreneurs having one assistant in each centre tor local knowledge service_ They are governed by a local multi-stakeholder committee and are well-linked with Govt.,. other NCO and Practical Action's experts. The centre served range of f and non-farming techooloa booklets, leaflets.. C and tact sheets at local prottem solving answers to ils

iR **also well-egtiipped with intermit** resources. website - .idrvbrw.practicalationorg and **other** Nimilo **webetes, The operational** modei Lines not require project used support, and in king rim Can r1.131 3nallependently f0114)Wing a COM recovery method and local institutional support It was reco:rded **that eac h Gyaher Haat red 0.K(award 1800** miquires per year, reached around **25(3 hotisehoLds covering 15 villages- be Ices al the** centre such as computerMimilow Sr training,. **diRital photo** printing, **khow]eclge-** froterkal dIslabcia.ori, audio-visual at ow, distribution of various Govt_ forms., photocopy *was* found **tiseitil. However, slew** Internet connectivity coupled with pain electricity supply was the key constraint.

lire Cyaner Haat was capable to serve mostly low and medium well-being categorryy people, however, didn't completely exclude the richer.

Finally it was learnt how knowledge worked for its clients_ It was. found that only advice has less to do with the knowledge seekers as there is scarcity of necessary inputs and lack of skill and services to act_ Therefore, an effective working rruodel combining with advice (information, knowled.ge), input (e.g. quality. seed. vaccine) and service (pu.string vaccine, animal treatment) made a big difference in knowledge services_ Sustainability of such centre lies with The capacity of local drivers.. suitable and institutional arangerr2nt and local owners of the centre. Subsidy may require nuining such centre in very remote locations_



RACTICAL ACTION1

Ifts# I

Transforming lands, Transforming lives

Sandbar Cropping;
An appropriate solution for millions living on the edge of mighty rivers in aangladesh

AZM Nazmul Islam Chowelhury and Nirmal Chandra. &wary
nazrnuldpraprifiralaction.org.b.d.

Apiculture production in barren and. unproductive said bar is an in ¯dmartive technology for the river eorno,..:-..:no!... The technolop has beer, **devejorci 21.7(16 and teszed Rtactio6 Action in G.,thrld ha -11 it u' north-wag The eri Ith§!ivt. vt-j7 significant impact on the du...lilac** L.1.1 L'; **num:1'0'HW In. terms of food security . improved** iEI; ;1111 ' ; 1-11 **1 Oierriativer** Lsk **trianAgetnent. Now the pe4IVOC. 1 m'kolop could be an opportunity for many los of displaced communitiesiaving** Ali **the edge of the mighty rivers at home in 13angla4a.:11 and abroad.**

Atg riculture producrion **in barren sandbar Is an** eti!•....1..r.:0 **lo w cost hd...nology** *foe* **the river erode] Lximmun Hips, whose villayph and 1;!rrn . have been log** ihn.1 **41 river erosion Arid whO are forced to Bye klieg-0:y on fl Zteglo embankments. The technology has. beer through series of action research siege 21:05-2** 01:14 **1. GaLbandha as a part of Asia-packfic {APTED) gold awayd** wining pimp Dearing Lards Prnied of **Action Bangladesh. :men r ihj3 furcri Trial has** shown highly slgoli•arli 1:11 iht. resource **poor displaced COnilitur:ikuN F)riivkamg opportunity far food production LA MS, handsome Lr•: asset generazion, inceeased** LYI TIN 11 r **ptlo» 9: nutrition and alternative risk** MU! **ument cluf ii .g. lean semen.**

Every year after r0.011.9010t1, **Large sandy islands ap in the major rivers of northwest Bangladesh. 'kills' are COtainOili property resources Loduding owrwd lands and untL1 now...have not been** used for any roductve purpose. The project has successfully monstrated that the K wi'ag of pumpkins in small **compost** pits dug into the sand is not only possible but profitable as well. Since its initiation in November under Disappearing and project A.273 beneficiaries have produced 33,6N mthic In (from 791 ha. Land using 663,928. pits) _of pum_pkins worth E2.2 millions net return based on 1.mal market value (estimated value at urban market E5,57 millions). The average **net return** EPL7 IXTLCildarieS in kW' Tears. stood C.1901 within 5-6 month in each rear_ The project monitored a representative sanTle of household's incomes over the period and .ciulatcd cost benefit ratios on a 17KULIT bilSis, which averaged a staggaring

The sandbars that emerge each year as the rivers recede are not stable enough to support natural vegetativeterowth and remain. barren until the river rises again_ by digging small pits and lining th e pib with compost. the protect has denions d that these arras can be made produdive. Large scale irrigation is not nect-ssary as the sand bars arc usually elope to the river and watering is done by hand in 60E114.' sears, where water channel is active or water can harves easily from underground ags the layer is very close t the surface, Generally, no pesticides or hue application of inorganic mputs are necessary.

The sandbar cropping measures its achievements b the levels of adoption of the technology' bv trainees and the spread of technolowi to new areas.' No credi was supplied to subsidize production systc however.. minimum inputs i.e. seeds and quick.

composts/fertilizers were provided to the farrners to run the demonstration_ The =rent project is s.1. -d.rig. only extreme poor households with little di ipproach based on asset tramfer mode of project operation(providing full costs demonstration), aiming to help e.rti•eme poor household to come out from poverty.

used on its multidimensional impacts on the poorer livelikroixs„ the technology is replicating in wider areas in North-west Rind could re ate in similar geographical environment in Ben adesh to benefit wide range of people in the uction, processing and marketing chain. The pumpkins produced on the sandbars can 6e stored in people's houses for up to 12-l. months and theretccre, greatly assists poor households from both income generation and rood security perspectives. In addition to the ptrrnpkins„ the twigs and flowers of the plant can be used for food,. and the entire plant fed to livestock at the end stage, or composted for the following year

Sandbar cropping transforms a barren landscape and the 'mini deserts into productive green fields which also supports a wide range of insect, binds and other small animal SpeCi29 by creating suitable micro-habitats.

Bangladesh is d Ley short of arable lands and struggles to teed its growing population. The technology would seem to have a much wider application in other dry areas and could eve% become an important copingx tegy in 5032i2 areas adversely affected by climate

The sandbar technology appears to be of low risk yet shows an impres sive financial return. This is an effective development idea that could replicate to use barren resourcoi and to benefit millicrns in the near future by formulating appropriate policy to support landlesspoor siru;E.Ling for sun-ival Mow poverty line in fragile en.vironment_

Based on the huge success on food production sandy barren lands by nmource poor erosion. affected laced comiramities in Garbandha, during 213131 - funded by Big Lottery UK, following the ding by GoB-DFID shires - the activities of the Asia Pacific gOld award winning project has been started in much wider scale under a new project namely "Pathways From Poverty" in four erosion prone districts of northwest Bangladesh.

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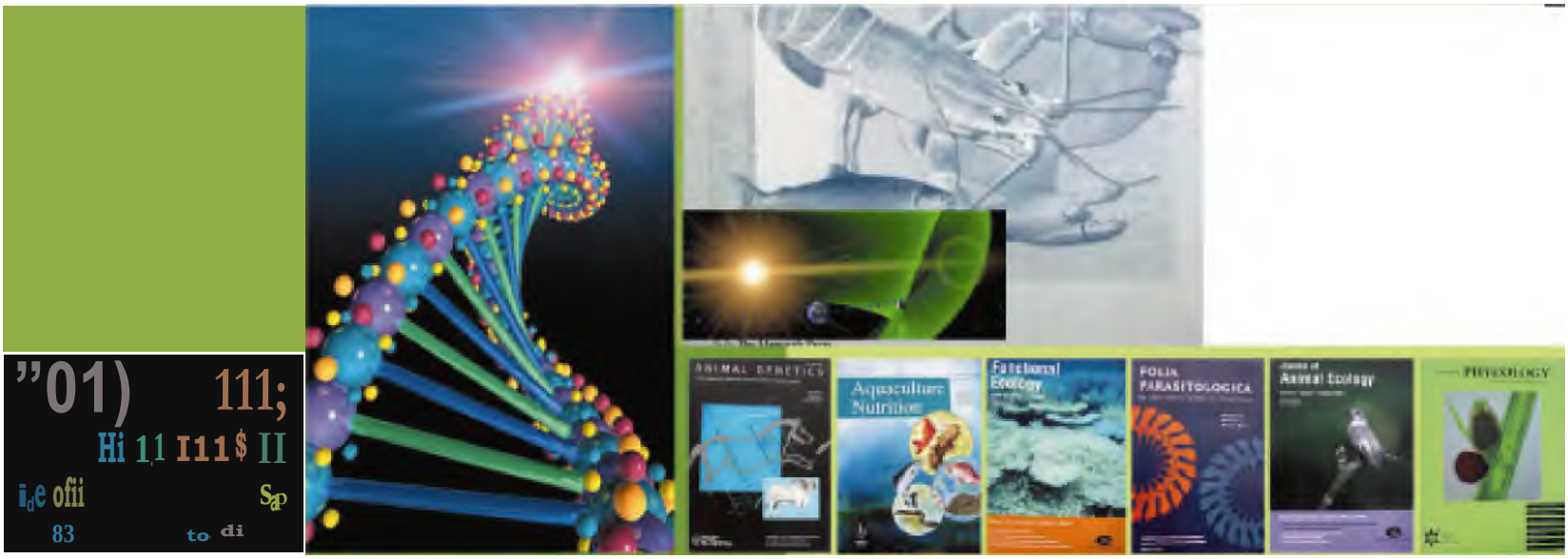
Innovision Consulti Private Limited works as the field of economic ant for puyerty ileadatuartered in D „ Bang. pft-h,. lnnovidon Consulting proyid.es **research** and management services to .development projects., national and international NCOs and the . .relopment partners to design,. m.anage. monitor, evaluate and communicate market **based** interventions that **inCLIVELS12** income of the poor and create& job opportunities in industrial and agricultural sectors or value chain& With 22 full time profesonals,. more than 3.0 part tuna researchers and consultants, internet based office Bet-up and logistic6 su port. Innovision is capable of moving our across the country at any given time,

[nnovision is a leading consulting firm_ in Bangladesh specializing. En the holistic market ed approadi also called M4P. 'Lhe Market Development Approach or Making Market. 1Vork for the Poor (Mt-P) provides the gcrvernment and the agencies a way to promote shared or inclusive growth and achieve sustained impact on poverty by charging how market systems operate. MC> focuses. on the underlying causes or failures that prevent market systems from working for the benefit of poor people. It **is a** comprehensive approach with appltcation in both economic and social fields.

Innovision has specialized experience in Bangladesh fisheries sector from the implementation of **two prelnI3115** value chain sizengthuiinK projeds- Market Development of Madaripuz and Shanatpur culture fish sector' and 'Stimulating. Growth in Culture of Tila t Pangus **Kai** and rrwnoting their llorward. Mar t Access {in collaboration with PIS), bath funded. **by** Katalyst.

implementation of these prokt ts. InnoviSion *has* gained thormgh knowledge about the fisheries. **Slfrktry** about the actors. and **about support market functions and regidatory** issues surrounding the sector. A strong network **have** *been* **established. with the** fish f amens.. hatchery **OW RerS, nursery IIerS, ors, 017u**ketirig intermediaries and government which **will** help us revealing further infonnahun **required in the sector.**

Innovision's clients include. ACDI/VOCA, Action for Enterprise (AFE),. Ekangladesh **Fisheries Research Forum (DFRF}.. CENIKYT, G1tP.Y1** Interrradonal Intercooperation, International pit v elOpinent Eroberp rift { I DE)... **International Prionte Corporation** (IFC),, Itternational Labour Organization (ILO). Malaria Corwortiurn, Montrote Airim. Opportunities Unlimited.. **Practical** Actions **l'iroiert Concern** International 0^{3}% **SmaR Micro Enterprise Promotion Srrvice (StiptEPS1 Swiss Agency** for Development anti Cooperation (SDC),. Swiiss.contact... Traiticra It Exchange. United Nations **Development PrograM.1711t** (UNDP'), 'World **Food Programme cleliFT), Medd ViSium VlicierldFis.h** Center. Elanglactesh Furniture Endustries Owners ASSociation. MAHON', Chars Livelilioods. **Programme (CLP).. Development Wheel (DeKk, Giant Agro Proorssing Limited,. Hal Complix{ Limite , Palli KarmaShahayak** Foundation (PECSF),. Swi6storrtact-Kattlytt and others.



The List of some of the best Known Journals yellh Impact factor's In INherels & aquaculture and pertinent aspects

The Journal Listill

Advances in Water Resources
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Aquatic Toxicology
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Canadian journal of Fisheries and Aquatic **Sciences**
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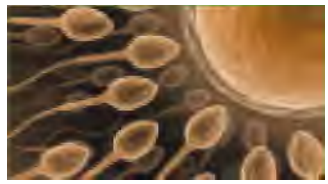

Journal. of Aqu.aculture Riearch & Developmprit
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Journal of Theoretical Biolopr
Journal of Tropkal EooLogy
Journal of World Aquaculture Society
Journal of Zoology
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Fish File

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Sisoridae
Si5GT **rithdarilandslTamiftack, 18.22**

***Ropier(Sfor ykthdcrpiknds,** SISSO7 **rhivrophonis**

Commas Nam Whip tail Catfish

Local name; Chenua, Siss[of]

Collet dm The Brahmarirtra, Mymertgingh,. Marth 04..2 M

Preserved in Fish Museum BindiverAry Colter,. EIALI , Mymensingh, Bangladesh

13Lodiversity Stems ; Critically Endangered

51wrMdmu.
Prroilckse

Sisor rabdophorus Hamilton, 1822

Key chammier_. Elongated, tapering body_ 'Dorsal side behind dome firm and the dorsal t:e_Re covered by plate like sr_a[4m. 12 43FIRef5Lt9 **rinv at the poRterior part of the body like a pipe fish or crocodile. Upper caudal ray gre-atly octended, longer than main body length_**

Total length:10.0cm (standard Length)

Natural habitat: Freshwater, clemersal.. polarnodromous. Live in the Bandy **bottom of the hilly rivers, rivulets with strong currents. Occa_sionally caught_ Found in the rivers of Jaflong area, Sylbet,** *the* **Moharkarida and Kakra of Diriajpur, and the Bra.hrnaputra,„ Kangsa and Someswari of Myrnertsirigh. AWN available in India, Nepal and Pakistan.**

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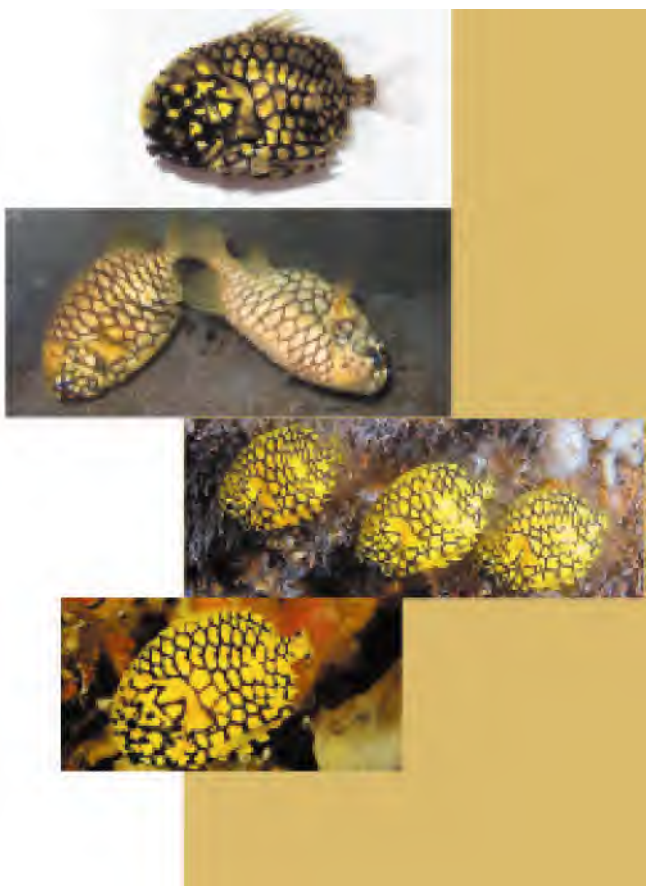
EL		A	
ED	15	C	11

Fishes of the World

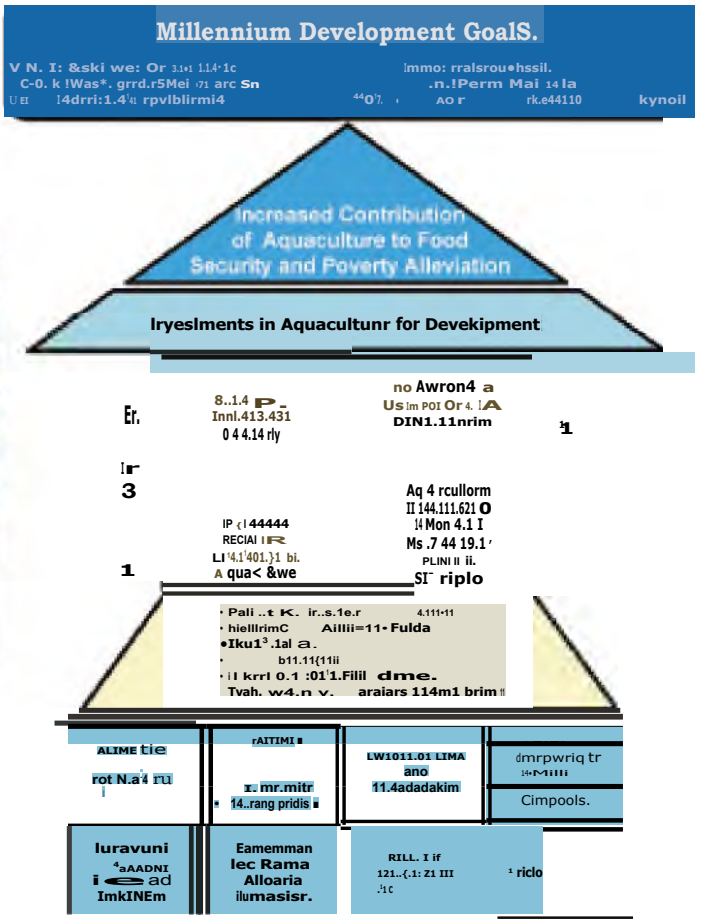
This pineapple fish owes iii name to its shape and its. large scales with black margins. The background colour varies from yellow to Gener.ally the pineapple fishes are observed in the deep sea cave hidin3 with a number of Roc (deep Sea zrches). bm1.e of the pinezp ple fis are often seen divers on shallow coin reds,. but is caught in deeper offshore waters up to .25C1 m deep.

Two common pineapple fish are - Monscentris j[redacted]nicra and Cleidopus &riarrwris. Most of tibe [redacted] pie .5.sh. have perwedul wines on both the and ventral suilace that can lock in position and give them a formidable defense_ This enables the fishes to wedge into rock crevices_

On the Iowan side of the jaw,. a light organ is situaied with bio-luminescent bacteri.a that gives off an orange colour in the daytime and a weak bluish-AO at night_ The fish is capable of turning its t on and off by covering up the light organ with a skin-fold as it wishes. The LUC DUMB' fish venture out into open water to feed on small fish and crustaceans (Shrimps) that are attracted to its shimmering light_ The ocean depths are full of acanues that ac4t to extreme surroundings such as the lack of t and the bio-lominescence IE therefore extreme y helpful as a way of rerogniefin animals of the same species as well as for nu display and capturing prey_ The pineapple fish is popular aquarium epees.



AFSPAN



FAQ-BFRF Collaboration AFSPAN

AFSPAN Project Ls a three-year initifIrLiNe to improve our undersLariding of the role of aquaculture in *food* security,. poverty alleviation and human nutrition. The project is developing new methodologies to quantify the impact cif aquaculture in developing natiorLs and Low income food deficit countries, It is funded by the European Cornmimion's 7th PraineworkFrograrnrne.

Aquaculture is widely considered an important component for enhancing food security. income and However, Mile information is available concerning the direct and indirect impacts of aquaculture on food security and poverty alleviation. in most developing countriiN_

Strengthening the knowledge base surrounding aqiiaculture and *food* and n.utritioo security through the AF PAN Project will provide the evidence upon which sound resource allocation and strategies *can* be based_ It will enable the efficient planning. Coordination and implementation of research and development programmes supporting the sustainable *expsnsion* of aquaculture, and increasing its impact on food security and poverty alleviation.

The project is being impLemented by a nymber partners including 11 from selected low income Food deficit cokintries. 3 EU partners. *and* 3 international organisations_ Project partner countries were *seLected* based on varied human development oonditionsancl national level efforts in including aquaculture for improving national food security and alleviating poverty_ They reprimen.t all major aquaculture regions where aquacurture hay rrode a major contribution to the national economy. involves large numbers of small-scale aquaculture farmers, and with significant international trade of fish and fisheries. prOCLLICL9.

The results of the project will be brought to the attention of countries and development partners, particularly the EU. The outputs will help Low income food deficit countries and various development partners to improve efficiency and coordination. in development initiatives focused on aquaculture 3_9 a meant. of promoting food security and poverty alleviation_

The first meeting of the AFSPAN Project has concluded in Penang, Malaysia, hrAted by the WorIcIFish Center from 10 to 13 September 2011 The inception workshop was convened to allow technical and country partners is dLicuas the work programme, identify in-country data gathering requirements and to develop implementation strategies for the project.

Collaboration AFSPAN

The partners

Feed acid Agriculture Orwirdsation of the United Nations	Ruhana Subasinghe
WorldFish Center	Dr .Shakrmtala HaraLqingh Thitsted
Institute or **Developmkot %idles**	Ch.tis **Retie**
Centre of the Economics and Management of Aquatic Resources Unix ers ity of Vortumouth, 1_0<	Professor 'Frond Biorndal
DeparlmeM of Hurran. Nutrition, Uraversity of Ctipenhagen, Denmark	Dr Narita Root
University of Stavanger,. Norway	Dr Frank Aic he
Network of Aquaculture Centres in Asi.a-Pacific	Dr Simon Wilkinson
Pan ladesh Fisheries Research Forum, BEIriglaily.h	Professor Mostafa A R Hossain
Freshwater Fisheries Resent Chi Academy of FLshery Sciences,. China	1[l] [v:6m:tot Yuan **Xinfma**
National Fisheri4N **Develornenk Board. India**	Dr Vishnu titia.t
Aquaculture Department. Southeast Asaan FisherieN Develop:mart Center, The PbilippineN	Dr Felix G. Ayseri
Resear.-11 Institute for Aquaculture No. 1,. Vietnam	Dr Phan TN. Van
Pigmies Department, Ministry of PhilEn42:5 DetTkiplilErlt, KOMI	Ms. Beatrice Nvandat
DeparnnenI of Rod 5ciane.e and TechndLogy. Priakerere University,. Uganda	Professor John FL Miryorsa
School of Agricultural Sciences. University of Zambia, Zambia	**Dr Drinah** Banda Nyirenda
Marine Mance rut :ill/te$_r$ 'Federal University of Ceara, Brazil	DT Ljria **PArente Maia**
school of Marine Scicm-s. Pontificia Univcrsi dad de Valparaiso, Chile	**Professor &Lail'** lel P. Conzalcz
Investigation bier. Universidad Centro Aittericarta, Nicaragua	Carlos **lose Rivas:Led***

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The projectit Eeir15:; **implemenk$_c$i** r!? **0,** ;s qe!. rlf Thipp. work **oas IriveErftrating different mpeds including the tole of aLlim;".:** SySteiet.t. SOCi41 p•.:] ...LI ! tura! LsSw. $_r$ **numtiCut, trade and markets kid 'ultemational. [4]:0[l]4[14]ttgi OM**

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AFSPAN-BD Inception Meeting

A •days long wurltshollep' was arranged the AFSP.AN-BD tearm in thc yfricv (Ti Bartgiadat F' ie Research Forum (BFA ■■E,lh:a, Ilanglack-th 26-27.09.2012. The vg waS attended by a.]] AFSPAN-BD teammeth ⬬ Prof. Mustafa A R Ilossain. Prof. Md. Saifiaddlin. Shah, Dr. M. Emma] Hog and Dr. Md. Alai= Hussain Mr. Md. AFIWWA Naqu Rgletrel Manager, 13FRF FILM; Dlitellaell

Project Attiwiries fur the first year, based un. AFSPAN Activity Patkage& was. the mainagenda to discuss in the worksb.ork At the workshop.. Dr. Hosin. explained the AFSPAN project t oritt„ goals and 4 3b iVeS., work arch...kir& under each work pat.ge„ the role ■■■:vork package leader& and COuntry partner& the deadlines and the itilatannesin detail to the AFSPANT• BL team.. He shared the beaming at id experience From the inception INCITI:Aaap in *Perarig, Malaysia.* The team then thoroughly discussed the prnentation made by Dr. Rana Submingheancloaler work package leaders in Penang during inciegTtion

Then. work pa s discussion *was* stald.. Dr. Hos:sain than everyone for helping in the 1 ..arartion of the 'Review and aBScSSTnent of naltiOngd and ink-rngitiOnai cr3Orraititan" under Work Package 3. The review that submitted in the AFSPAN dropbox was shared among the AFSPAN-13D team. The review was disrusdaed. Nitp by step and mode of further study artd Lk-A-work were itiEcusbeti in detail.

In the kicund day, the cateivrinlion f the a9naculture farms in Rangladish was the first item to disci.ms. Dr. Hain prasented the draft Otegorlft to the Warn what he presented In Perkang. Al] feir rneMbers owe their fftdbacks arid worments toimpro...e the six cowries Of 1.4kblculture kilts in.13angladuth,

The team then thoretighly disci.med about rhe site 9.electikin for the field Elchwitia covering all the different caftories of 21qualitture artiwitieS. The team decided tO wiled the primary data anti wandary data Cif riecesimry) from the kildwing districts and sub districts -

The region	Sub distict2
Diriajpi.u•Bogra•Rafshahl region.	Parted:04. Ergot* Adams/10i and Eiagmara
Greater Mymensingh region	Bhali.d4 Trisha. and Mukinviehha.
Khulna-Sat.thira-Jessore-Bagerhat region	Duantria, aiknpv.. Kalil:inn]. Shy !more Urd07. Mort)IgTIN 011141 5111 TILIPO t
Coadlia-Noakhali-Chittagong•OWs Bazar region	Chimlipkix &adv. Hajigonj. Noakhati mitt. Cox'sbazar &War,. Mohe!shir.hall.Teknaf

The team decided to go to the rebonruaissance survey nn the first week of the November,. 2011 They 21IFICF agreed to employ 3-1 Fleiearch AIIFIETtanK preFerably fresh *Mc* (in Fisheries VS In isherieq (if available). After recruiting *the* Research Assistants, the team will train them about how *to* coiled data and will work et the beginning with the Fte:;e-arch AL%sistanlq. for a week or RCN in the field_ In addition., the 101.131 members wilt frequent[}' visit the survey sites to oversee the work of the Research A5s-IstanL9 and to asHist them.

Dr_ Hos.inin then highlighted on keeping the reconk of the working houri by each of the team members under AP:WAN-BD. hrialEy the team diLwu ei.1 on the feedback from *the* work package leader regarding quoikialnalie and of tooti to collect data, the format of submitting activity- and financial- reporK The team llamented that Dr. lasq.ain. should keep close contact with FAO and differ n! Work Package leaden_ Dr. Hosraln informed about AFSPAN drophox and the webpage afqpan.net to the team members. Finalfy APSFAN-13D team thanked EFRF and decided to have next meeting at the 3rd week of November after *the* reninnaksonce gurvey.

The Peer Reviewed Papers

ii$t of th4. p.ppurb publi Am! cluri internotic.mol pernrevicwirci numbILLI of overseas scientkIrts **2011-212 On Bangladesh fisheries, pipacaltnnt and ridged a** spuch6 in **with impact factors - [nosily by the liongladeshi authors long with**

- Ahamed,. F, MY. Hosmin,. B. FuJanda, Z. F. Ahmed. and J. Ohtueni_ (20121 indiscriminate mpinitation of wild prawn pustlanrae in the coastal regiun Bangladesh: A. threat to the fisheries rescrurcm,. community livelihoods and biodiversity. !Donn & Coastal **Manaserrenr** 456:56-152.

* Ahmed, N. and S.T. Corn-tt. **(2311) Int.wa Led rice-fish farming in BanOarlesh; lipleethig. the challent-s of food strurity. Food &clarity 3(1): 81-92.**

* Amin A.KM.P._„ IsLara M_A„ Kader M_ A., **Buibu] Hussain M.A R. and A.2fun M. E. (2011) formince oi sutchi catfish Fanssisian** Cid on **ophthalmia 5. in restricted feeding** re i is on gut„ liver and meat quality. **Ac]** eu **Research 1=7**

- **Barman,. B-K·** and D. C. Little. (21311)Use **tapes to** Loadlile (Oreodieroinis piMatix..its 14 seed in **icodfish ponds: A ppaarticipatnri trial with small-scale** fan **in** iis in Northwest Bangladesh. Aqu tare .31711-4): 214-222

■ 13eltori, B. and k Azad. (2012) The characterimim and s-hatus of pond aquaculture in Banglad esh_ Aquaculture W,-3.5ati96-2011

■ Belton, R, M. M, Have, LP, **C. Little and L. X. .94inh. 2Crl.11 Certifying** catfEsh Ln **Vbetripsn and BanaladeR.h! Who wni make the grade and wLl] It maw? Food** w2)! 238-299.

- Belton, B. **and D.C. Littla(NU) krimanant** and lnterventionist **]eland Asian Aquaculture** Development and its Outcomes. Development Policy Review 29(4)! 459-4154.

▪ Rhuiyan„ NITA:N, ami D. Duns_ 1211112) Assess Ing imps of sea level rise On river salinity in **the Golii river network** Biagle3h, ElltLiatirie, **Ala[and Shell Ley we %: 21.** 7.

■ Deb, A. K. and C. E. Hague. (2011) EVIETV mother is a mini-dcpace Unnamed icing main of figh, shellfish and some other aquatic animals in **EangLades.h. Journal of Ethnopharrnacology** 134(2)4 25

- **Evans, L., N. Cherreff and a l'ems1{2.0]1) Assessing the impact of fiNlirnI., co-management into in developing coo riz.1.1-3: A metaqinalysis. Journal of Envirorunentvd l'aLumgonent 92(13); 19 .1949.**

- **Gregory, MG., Mit ALarn,** M.M_ Rahman,. M_A_ Jahhar. Mme. Uddin_ (2211) A rote on water quality **associated** with slaughter **premises in Raingladesh_ Meat 5Lience** 138**(4 791-791**

- **Habiba, LT., R. Shaw and Y. Takeuchi. (2012) Fairer's** perception **and adaptation practices to cope** with drought Perspectives **from Northwestern 13arE:i!deall. lnbanational journal of Disaster Risk Rei.ftiction, In rnms, Corrected. Proof, Arailabk tint 12 June 2012.**

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- **Hmain„ M. A, IL, M. Nahiliquaman, and T. R.** Tlim•-c21. (2011) Develop niimit **of a** Sperm Ci'p T7!•!'·i TS:i! **[ion Approwil ic, Fish Blodivenity** CriNt' 311 1: ,..1g1A 1n ---h• :: 1 Cill3pri**mer**ntIon **Aquatic lkviesr T. x Tiersch and C C Green, itors_ World** AI **inaczlitule Soclety, Baton Rouge.. Louisiana. pp. 52-vN61.**

- H, in **M.A.R., Nahiduzzarnan. M., Hassan Cvl.M.„ Sultana. MA, /later S and Ham an M. A. (20111 Sperm** ‹ryopreserwation of Aft endalwred **frrshwaber s, y** eel,. **MostareTittireiris april cpede, 1:11** *for* **biodiversity cvnsiervatic...ri** iii **slailesh.** D.- **0 Journal of Science** and Tethnolo20 7(12); 57.66.

- I hassain M. A R„ **Nahiduzzaman Ar and Tiersch T. R. Ill Developtnent of a Sperm Cryopreserreation Aprach to the Fish Biodiversi = in II** In ation in Aquatic **2nd ri**ñ0cl_T. Tie and C.. C. Green, editors. World Aquaculture Sxiety„. Baton Rouge, Louisiana. Pp. ii62-61

▪ **Nun, G.M.N.,** T. 5- **Yew, N. M. R. Abduilah** and K. **K VISWargiliVin. {2011) Social capitp,I„ m-mvir-ity** ***trainagementr*** **and. fishers' livelihood** :ri laLleth. OCeetrt k G>~a **I Managermat** 5 ;..l 7.1130.

■ [slam,. M.A. **Razzak, E 1.A Islam, M.L** Bari, A. Basher, F.R. Chowdhury„ A.] .M.. Sayeduzzaman, EI.A.N'LN. Ahaisa-n, MA Faiz, **Arakawa, Yotu-Yamashita,** U. **Kuck and D. mks_ a1)71) Puffer fish "'Awning in Bangladesh clinical and toxicological results -rorn Carp outbreaks.** ilk MI& Transactions. of the Koval **5:Pciety al Tropical Medizine and Hyper's-11M 74-80.'**

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■ Karim, M., D. C. Little, M. S. Kobir, M. J.C. Vend T. Telfzr, M. A. Wahab. peni) Enhancing benefits from ..Iyrultures including tilapia (Oreochromis nil. ..ma) within integrated pond-clike systizma: A participatory trial with households of varying SIXIII-ECODOMIC Level in rural and peri-urban areas T Bangladesh Aquaculhrreal4(1-4); 225-2:15.

• Khan, M.A.. 1. F. Alarm gind. K.J. t L m. (12) The impact of LI) ni;rnagerftent l 1d plc m And expencliturl..: Ali empirical arialysia of common property fiNlieTy resource management in ant lade h. Chx;!..ri4 C-oastal Management 65:67-7EL

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Upcoming Seminars

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4qua and Fisheries Management (191.1AF 2013)
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10th to nth April apn
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European Seafood Exposition
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23rd to 25th. April 2013
Location: Brussels, BeLgitmk

INTERNATIONAL SEWN AR L MARINE SCIENCE & AQUACULTURE
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upcoming ser

Fish Week 2012

"Fish week'- an ins and colorful event. being observed every year with the participation of fish farmers, fisher* Ash tr.aders, institutions involved- the Ministry of Fisheries and Livestock (MaFL), Department of Fisheries. (Do.9, Bangladesh Fisheries Research Institute (BFRI), Bangladesh Fisheries Development Corporation (13FDC),, Universities, NG0s, associate national end international organizations Like Bangladesh Fisheries Research Forum (BFRF) and World Fish Center (WFC)., private organizations, people's representative from different strata and the mass people, has now become a festival in our c ountry.

Bangladesh is the third largest nigh producing country *of* the world followed by China and India.. Fish contributes about 60% of the animal protein supply of our people. About 10.5% of our population directly or indirectly involved in fi&buies.activities.

The aim of observing fish week regularly is to produce more fish, create employment opportunity and earn foreign currency through more export of frozen food and thus supply more nutrients to the people, creating investment opportunity and overall poverty reduction_

The objective is to create awareness for the wise management of fisheries nmources and disseminate modern fish culture technologies to *the* fanner. To raise social awareness,, this was first introduced the father of the nation Bongobon.dhu Sheri Mujibur Rahman in 1973 by stoc.; g fish fingerling in the Gonobh.abon Lake.

A day before commencement al the week a colorful rally with different banners, posters, and sfogen moved around the main roads of the capital city followed. by a news oorkference. This year the main attraction was a Living mermaid Leading the rally.

On 7th July 2131 2. the opening ceremony was graced by Honorable Prime Minister Sheikh Hasina, as she was kindly present as Chief Guest_ Most successful twenty fishikrmers and exporters were awarded for their valuable contribution for the promotion of fisheries sector. Fish fingerlings were stocked. in Gonobhabon Lake as a token to acceLerale fish production.

An art competition for the children was held to give them the opportunities to know the importance of fisheries sector and encourage them to know more about fish culture and to abide by *the* rules and regulations of fisheri. A five day Icing Fish fair, one of the most colorful and regular event of Ash week was held at Mumma Baia /OW.. Lots of visitors including students visited the fair to enjoy and to know modern fisherilm. technologies.

Publication of a compendium rich with different fisheries technology is a very important part of fish week. 'Scientific papers from different cornP_rs of this sector enriched the compendium which can be use ' as a source of information to the farmers, student and researches_ This event has duly been observe ' in the district,. upazile and in some cases at unio levels following the Ministry approved schedir:e.

11 4 s

Fisheries Information in Print & Electronic Media of Bangladesh

A.B.M. Mohain and 5hants Muhammad Gadib
Departilkerit of Fisheries, Univetsay of P..4shahi„ RajahahL-620.5
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At pras-erit day, ele4runic rftedla Ls the wit01.. cheapest, fa ste t ard most advanced a-Or1.1 riN! LE Inforrnaldon-PrInt media,. however,. Ls still a very Important sokirqe of Infarniation due 130 some specific adyaritage3._ Tn corriparLson to many other clankTing Countries of the wOrld, availability of flishierleg information of Bangladesh in various media Is far behind but advancing rapidly_ The available sources of fisheries Information .of BangladeSh Ln different print and electronic media are highlighted here.

Daily NevinipageTs

SeveraL newspapers publish agricultural Featured page including fisheries on weekly Exa.sia. There are no page based on only fisheries information. Brie[cLicription of these newspapers *are* premed here

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Television Channels

Like neviwapers.. there are Tin arm based on only fishers' in differarrt TV channels of Bangladesh A numb= of TV c 35 arc telecasting agrickdturc related ppoggarn.s. Fisheries related stories vet focused in these pro grams. A cornprabensivc record of these programs b listed here -

TV Channdi	Name of the program
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Islamic TV	& Eliplob
GTV	Sabra Elangla.

Websites

Websites

There L9 r5n complete Bangladesh fisheries inforination based site in Bangladesh *except* BcIFISH (untrioe_hdfishorg). BdFLSH is only website in Bangladesh based on shfinlutely fisheries info of the country. Weheila5 of some fisheries relevant organizations Like WcirldFish Center, BFRI,, BFRF,, DoF are fisheries based but they publish information, report and other docurnenb based on their own activitie9 only_ On the other hand, different encyclopedias and agriculture based web5ite9 provide fisheries info, as pert of their whole publication_ Here Ls a comprehernive cif such welzeite9 -

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BFRF - Ongoing Researches

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EIFIRF Executive Committee - 2012-2013

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BFRF Activities

Bangladesh Fisheries Pesecran **Foram (PIFPF) foresees ahead 10 be nourished OS On OrganizdfiOrk t0 provide iOlOtfarrn ror scientific collaboration. team work and create future horizon of research and development actEvities i fisheries sector Major objectives of BF* are to develop networking among %hews professionals and Institutions: to share knowledge and experience to promote growth of the sector: to iniiioie discussion grid dialogue' orriong creferent 5tokehdldJets; to cisisivr public and private ,9eclor, donors and development partners~ to seem funding from donors and other sauces to offer research awards to sciontistors to al:tress demand-led research; to organize workshops. seminars, conferences,. dialogues and troinings and to offer support services to incluvtlies, Qovernment and private sectors**