water

MDPI

Article

Fish Habitat Reclamation Based on Geographical Morphology Heterogeneity in the Yangtze River and the Short-Term Effects on Fish Community Structure

Supplementary Information

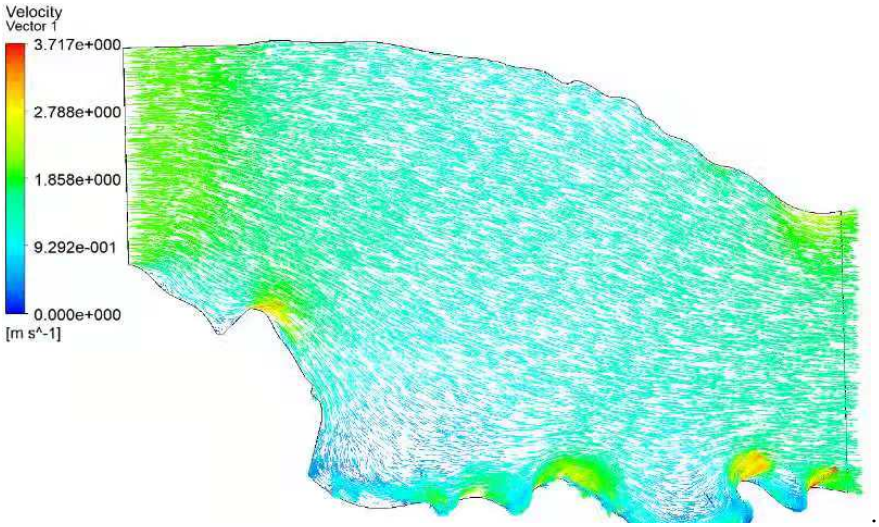
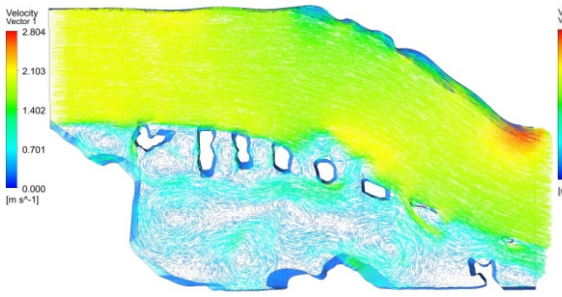
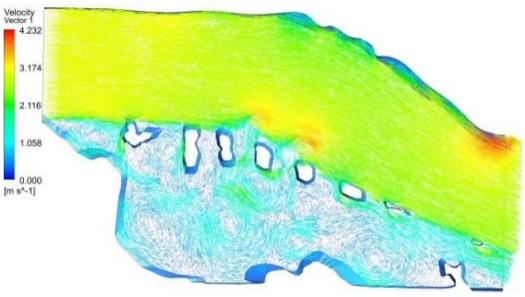


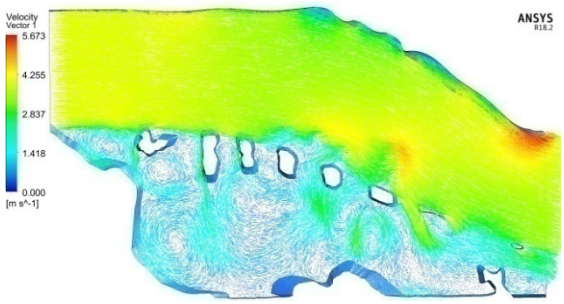
Figure S1. Nephogram of flow velocity before the implementation of the project. The inflow velocity was set as v_0=2.0 m/s.

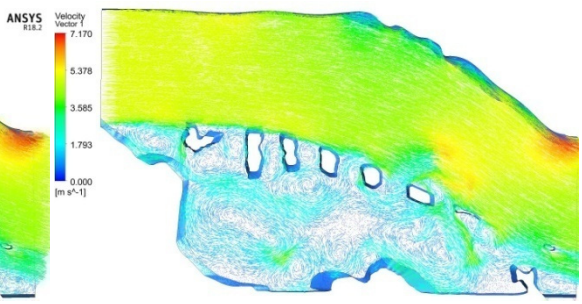


(a) v_0=2.0 m/s



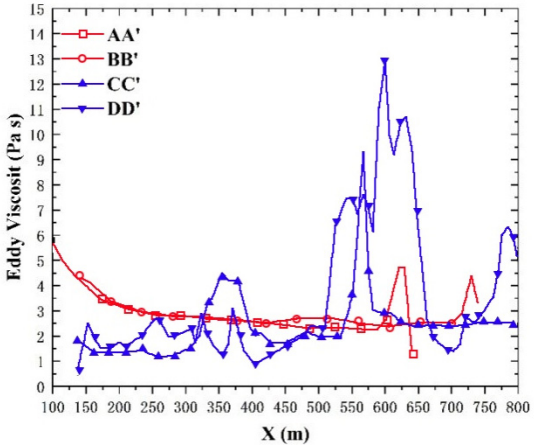
(b) v_0=3.0 m/s



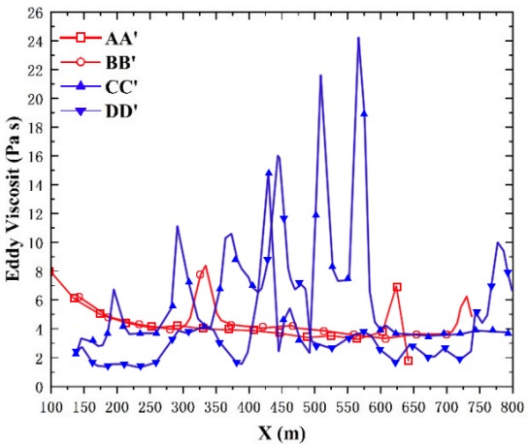


(a) v_0=4.0 m/s (b) v_0=5.0 m/s

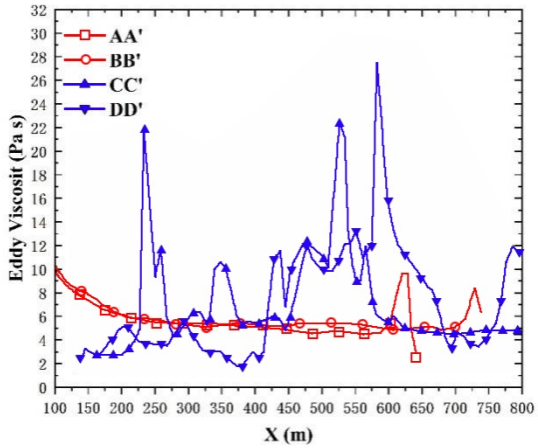
Figure S2. Nephogram of flow velocity at different inflow velocities after the implementation of the project. The inflow velocity was set as v_0=2.0 m/s (a), v_0=3.0 m/s (b), v_0=4.0 m/s (c), and v_0=5.0 m/s (d), respectively.



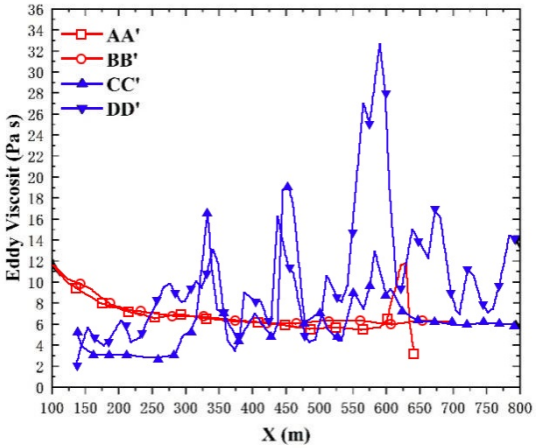
(a) v_0=2.0 m/s



(b) v_0=3.0 m/s



(c) v_0=4.0 m/s



(d) v_0=5.0 m/s

Figure S3. Changes in turbulent viscosity at different inflow velocities. The variation in turbulent viscosity at the intersection of AA', BB', CC', DD' and the water surface was analysed to compare the turbulence characteristics of Area I and Area II. The inflow velocity was set as v_0=2.0 m/s (a), v_0=3.0 m/s (b), v_0=4.0 m/s (c), and v_0=5.0 m/s (d).

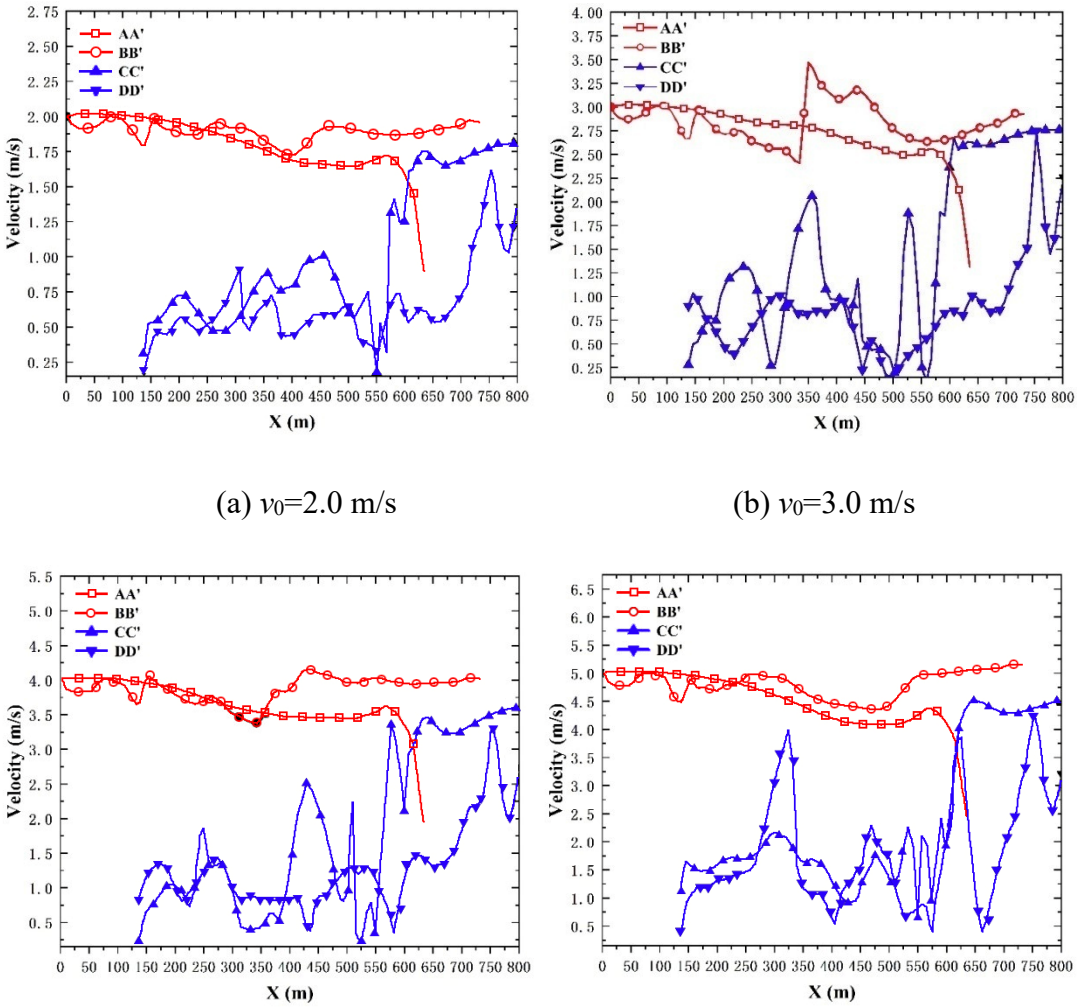


Figure S4. Velocity distributions of the flow field on cross-sections at different inflow velocities. AA' and BB' represent the current velocities at the water surface at Area II, while CC' and DD' represent those at Area I. The inflow velocity was set as v_0=2.0 m/s (a), v_0=3.0 m/s (b), v_0=4.0 m/s (c), and v_0=5.0 m/s (d).

Table S1. Fish species collected before and after the implementation of the project. "◎" means the fish were caught before the implementation of the project; "□" means the fish were caught after the implementation of the project; "★" means endemic fish; "▲" means rare fish.

Species	Before	After	Rare and endemic fish	Magration type	Spawning type	Ingestive type	Flow preference	Habitat water layer
I. ACIPENSERIFORMES (1) Acipenseridae								
Acipenser dabryarus (Dumeril)		□	▲	Freshwater sedentary	Sticky egg	Carnivorous	Rheophilic	Middle-lower
II. CYPRINIFORMES (2) Cobitidac								
Trilophysa bleekeri (Sauvage *et* Dabry)	◎	□		Freshwater sedentary	Sticky egg	Omnivorous	Rheophilic	Demersal

Misgurnus anguillicaudtus (Cantor)	◎	□		Freshwater sedentary	Sticky egg	Omnivorous	Rheophilic	Demersal
(3) Cyprinidae								
Zacco platypus (Temminck *et* Schlegel)	◎	□		Freshwater sedentary	Demersal egg	Omnivorous	Rheophilic	Pelagic
Opsariichthys bidens (Günther)	◎	□		Freshwater sedentary	Demersal egg	Carnivorous	Rheophilic	Pelagic
Ctenopharyngodon idellus (Cuvier *et* Valenciennes)	◎	□		River-lake migration	Drifting egg	Phytophagous	Stagnophilic	Middle-lower
Distoechodon tumirkstrispeters	◎	□		Freshwater sedentary	Sticky egg	Omnivorous	Stagnophilic	Middle-lower
Xenocypris yunnanensis (Nichols)		□	★	Freshwater sedentary	Sticky egg	Omnivorous	Stagnophilic	Middle-lower
Xenocypris davidi (Bleeker)		□		River-lake migration	Sticky egg	Phytophagous	Stagnophilic	Demersal
Hypophthmichthys mobitrix (Cuvier *et* Valenciennes)	◎	□		River-lake migration	Drifting egg	Planktonic	Stagnophilic	Pelagic
Rhodeus ocellatus (Kaer)	◎	□		Freshwater sedentary	Shellfish laying egg	Omnivorous	Stagnophilic	Demersal
Pseudolaubuca engraulis (Nichols)	◎	□		Freshwater sedentary	Drifting egg	Omnivorous	Rheophilic	Pelagic
Pseudolaubuca sinensis (Bleeker)		□		Freshwater sedentary	Demersal egg	Omnivorous	Rheophilic	Pelagic
Sinibrama taeniatus (Nichols)	◎	□	★	Freshwater sedentary	Demersal egg	Omnivorous	Rheophilic	Pelagic
Pseudobrama simoni (Bleeker)		□		River-lake migration	Drifting egg	Carnivorous	Stagnophilic	Pelagic
Hemiculter leucisculus (Basilewsky)	◎	□		Freshwater sedentary	Demersal egg	Omnivorous	Stagnophilic	Pelagic
Hemiculter tchangi (Fang)	◎	□	★	Freshwater sedentary	Sticky egg	Planktonic	Stagnophilic	Pelagic
Hemiculterella sauvagei		□	★	River-lake migration	Sticky egg	Planktonic	Rheophilic	Pelagic
Culter ilishaeformis (Bleeker)	◎	□		Freshwater sedentary	Drifting egg	Carnivorous	Stagnophilic	Pelagic
Culter mongolicus (Basilewsky)		□		Freshwater sedentary	Demersal egg	Carnivorous	Stagnophilic	Pelagic
Ancherythroculter kurematsui (Kimura)		□	★	Freshwater sedentary	Demersal egg	Carnivorous	Rheophilic	Pelagic

Hemibarbus labeo (Pallas)	◎	□		Freshwater sedentary	Sticky egg	Omnivorous	Rheophilic	Middle-lower
Hemibarbus maculatus (Bleeker)	◎	□		Freshwater sedentary	Sticky egg	Carnivorous	Stagnophilic	Middle-lower
Pseudorasbora parva (Temminck *et* Schlegel)	◎	□		Freshwater sedentary	Sticky egg	Omnivorous	Stagnophilic	Pelagic
Rhinogobio typus (Bleeker)	◎	□		Freshwater sedentary	Drifting egg	Carnivorous	Rheophilic	Demersal
Abbottina rivularis (Basilewsky)	◎	□		Freshwater sedentary	Sticky egg	Omnivorous	Stagnophilic	Demersal
Abbottina obtusirostris (Wu *et* Wang)	◎	□	★	Freshwater sedentary	Sticky egg	Omnivorous	Stagnophilic	Demersal
Saurogobio dabryi (Bleeker)	◎	□		Freshwater sedentary	Demersal egg	Omnivorous	Stagnophilic	Middle-lower
Squalidus argentatus		□		Freshwater sedentary	Demersal egg	Omnivorous	Stagnophilic	Middle-lower
Rhinogobio ventralis (Savage *et* Dabry)		□	★	Freshwater sedentary	Drifting egg	Carnivorous	Rheophilic	Middle-lower
Acrossocheilus monticola (Linnaeus)	◎		★	Freshwater sedentary	Demersal egg	Carnivorous	Rheophilic	Pelagic
Cyprinus carpio (Linnaeus)	◎	□		Freshwater sedentary	Sticky egg	Omnivorous	Stagnophilic	Middle-lower
Carassius auratus (Linnaeus)	◎	□		Freshwater sedentary	Sticky egg	Omnivorous	Stagnophilic	Middle-lower
Procypris rabaudi (Tchang)		□	★	Freshwater sedentary	Sticky egg	Carnivorous	Rheophilic	Middle-lower
III. SILURIFORMES (4) Silurdae								
Silurus asotus (Linnaeus)	◎	□		Freshwater sedentary	Sticky egg	Carnivorous	Stagnophilic	Demersal
Silurus meridionalis (Chen)	◎	□		Freshwater sedentary	Sticky egg	Carnivorous	Rheophilic	Demersal
(5) Bagridae								
Pelteobagrus fulvidraco (Richardson)	◎	□		Freshwater sedentary	Sticky egg	Carnivorous	Stagnophilic	Demersal
Pelteobagrus Vachelli (Richardson)	◎	□		Freshwater sedentary	Sticky egg	Omnivorous	Stagnophilic	Demersal
Pelteobagrus nitidus (Sauvage *et* Dabry)	◎	□		Freshwater sedentary	Sticky egg	Carnivorous	Stagnophilic	Demersal
Leiocassis longirostris (Günther)	◎	□		River-lake migration	Sticky egg	Carnivorous	Stagnophilic	Middle-lower

Leiocassis crassilabris (Günther)	◎	□	Freshwater sedentary	Sticky egg	Carnivorous	Rheophilic	Demersal
Pseudobagrus truncatus (Regan)	◎	□	Freshwater sedentary	Sticky egg	Carnivorous	Stagnophilic	Demersal
Mystus macropterus (Bleeker)	◎	□	Freshwater sedentary	Sticky egg	Carnivorous	Rheophilic	Demersal
(6) Amblycipitidae							
Liobagrus marginatus (Günther)	◎	□	Freshwater sedentary	Sticky egg	Carnivorous	Rheophilic	Demersal
(7) Ictaluridae							
Ictalurus punctatus (Rafinesque)	◎	□	Freshwater sedentary	Sticky egg	Carnivorous	Stagnophilic	Demersal
IV. Synbgranchiformes (8) Synbranchidae							
Monopterus albus (Zuiew)	◎		Freshwater sedentary	Pelagic egg	Carnivorous	Stagnophilic	Demersal
V. PERCIFORMES (9) Serranidae							
Sinrperca kneri (Garman)	◎	□	Freshwater sedentary	Pelagic egg	Carnivorous	Stagnophilic	Middle-lower
Simiperca scherzeri (Steindachner)	◎	□	Freshwater sedentary	Pelagic egg	Carnivorous	Stagnophilic	Middle-lower
(10) Gobiidae							
Rhinogobius giurinus (Rutter)	◎	□	Freshwater sedentary	Sticky egg	Carnivorous	Stagnophilic	Demersal
(11) Channidae							
Channa argus (Cantor)	◎	□	Freshwater sedentary	Pelagic egg	Carnivorous	Stagnophilic	Demersal
(12) Odontobutidae							
Odontobutis obscurus (Temminck *et* Schlegel)	◎	□	Freshwater sedentary	Demersal egg	Carnivorous	Stagnophilic	Demersal