

Goal 1. Enhance knowledge of freshwater fish diversity, ecology and conservation status

Objective 1.1 Determine freshwater fish diversity in the Lower Kinabatangan floodplain	
Activities	Output
Activity 1.1.1 Conduct fish sampling in the community fishing zones of at least 4 villages in the Lower Kinabatangan to determine fish: 1) diversity , 2) distribution, abundance, and 3) assemblages	<p>Fish sampling:</p> <ul style="list-style-type: none"> • Sampling methodology (gear type, parameters) determined by the end of 2Q; • Sampling sites determined by the end of 2Q; • Sampling conducted at each site at least once per season by the end of 7Q
	Native and invasive species list of produced by the end of 7Q
Activity 1.1.2 Conduct interview surveys in at least 4 villages in the Lower Kinabatangan to determine 1) values and uses , 2) changes, and 3) threats to river resources	At least 5% of adult population of 4 villages participate in interview surveys by the end of 2Q
Activity 1.1.3 Collect photos for identification of fish species	Basic photo identification guide for fish diversity produced by the end of 7Q
Objective 1.2. Assess and monitor fish habitat health (i.e. water quality, physical river characteristics, and riparian health)	
Activities	Output
Activity 1.2.1 Conduct literature review of previous hydrological and water quality surveys in the area	<p>Water Quality Monitoring:</p> <ul style="list-style-type: none"> • Monitoring parameters selected and tested by the end of 2Q; • Sampling sites determined by the end of 2Q; • Samples collected at each site at least twice per season by the end of 7Q
Activity 1.2.2 Conduct water quality monitoring (e.g. dissolved Oxygen, pH, conductivity, Nitrogen and Phosphorus) in the riverine area of at least 4 villages	
Activity 1.2.3 Conduct physical river property monitoring (e.g depth, flow, salinity, temperature) in the riverine area of at least 4 villages	<p>Physical River Quality Monitoring:</p> <ul style="list-style-type: none"> • Monitoring parameters selected and tested by the end of 2Q; • Sampling sites determined by the end of 2Q; • Measurements taken at each site at least once per season by the end of 7Q
Activity 1.2.4 Design parameters for riparian habitat quality and conduct assessment	<p>Riparian Habitat Assessment and Monitoring:</p> <ul style="list-style-type: none"> • Rapid assessment parameters determined by the end of 2Q; • Sampling sites determined by the end of 2Q; • Rapid assessment conducted by the end of 3Q; • At least 80% of riverbank between Abai and Batu Puteh upriver extent of fishing area monitored by the end of 7Q
Activity 1.2.5 Conduct riparian habitat monitoring in study area	

Activity 1.2.6 Design indicators and methodology for long-term monitoring of fish habitat health implementable by local communities	Methodology for long-term monitoring of fish habitat health developed by the end of 7Q
Objective 1.3 Determine critical habitat and other important ecological features of fish species of concern (i.e. exploited by the fishery and other globally threatened species) through the combination of local ecological knowledge, verified through scientific methods	
Activities	Output
Activity 1.3.1 Conduct interview surveys in at least 4 villages in the Lower Kinabatangan to determine 1) values and uses, 2) changes, and 3) threats to river resources	Perceived critical habitat identified through local ecological knowledge by the end of 2Q
Activity 1.3.2 Conduct participatory mapping in at least 4 villages from active and retired fishers to: 1) gather current local ecological knowledge relating to fish abundance and distribution , 2) gather past local ecological knowledge relating to fish abundance and distribution, and 3) map current riverine river use with emphasis on fishing activities	Perceived critical habitats tested using known ecology of species, scientific observation from fish and habitat sampling by the end of 6Q
Activity 1.3.3 Conduct fish sampling in the community fishing zones of at least 4 villages in the Lower Kinabatangan to determine fish: 1) diversity, 2) distribution, abundance , and 3) assemblages	
Activity 1.3.4 Compile spatial information from local ecological knowledge and scientific outputs (including fish habitat information from Objective 1.2) in GIS	Map of critical habitat (areas important for species survival) for fish species of concern produced by the end of 6Q
Objective 1.4 Determine impact of fish habitat quality on fish species assemblages to prioritize species of special concern (i.e. important native species exploited by the fisheries; globally threatened species)	
Activities	Output
Activity 1.4.1 Conduct fish sampling in the community fishing zones of at least 4 villages in the Lower Kinabatangan to determine fish: 1) diversity, 2) distribution, abundance, and 3) assemblages	Sensitivity of existing fish species to fish habitat quality ranked
Activity 1.4.2 Conduct literature review of known biological and ecological information	
Activity 1.4.3 Conduct predictive modeling to determine fish species distribution under different fish habitat health scenarios	
Activity 1.4.4 Determine sensitivity of fish species to habitat health through relating differences in distribution, related fish habitat health (from Objective 1.2), and known ecology of species	
Activity 1.4.5 Identify fish species for long-term monitoring through focus groups, considering fish sensitivity findings, species exploited by the fisheries, and globally threatened species present	List of species for long-term monitoring determined by the end of 8Q

Objective 1.5 Identify threats to native fish diversity and abundance

Activities	Output
Activity 1.5.1 Conduct interview surveys in at least 4 villages in the Lower Kinabatangan to determine 1) values and uses, 2) changes, and 3) threats to river resources	Assessment of threat of fishing activities on fish and other aquatic populations produced by the end of 6Q
Activity 1.5.2 Conduct participatory mapping in at least 4 villages from active and retired fishers to: 1) gather current local ecological knowledge relating to fish abundance and distribution, 2) gather past local ecological knowledge relating to fish abundance and distribution, and 3) map current river use with emphasis on fishing activities	
Activity 1.5.3 Conduct spatial change detection analysis to determine relationship between terrestrial land use change with changes in fish distribution over time, using participatory mapping outputs and satellite images from corresponding periods	List of threats to native fish populations developed by the end of 6Q

Objective 1.6 Determine population trend/conservation status of fish species of concern

Activities	Output
Activity 1.6.1 Conduct literature review of previous fish surveys in the area	Conservation status of fish species, currently and previously known to the area, documented and submitted to inform IUCN Red List status by the end of 8Q
Activity 1.6.2 Compile and share freshwater fish population trends and threat data , based on Goal 1 results, with the IUCN Freshwater Fish Specialist Group	

Goal 2: Enhance local capacity and commitment for management and conservation of freshwater fish resources

Objective 2.1 Improve local, State and National stakeholder awareness relating to river health and ecology	
Activities	Output
Activity 2.1.1 Conduct restitution activities with local communities and government agencies to: 1) facilitate knowledge sharing and promote discussion of activity outputs, and 2) develop potential solutions for threats identified	Restitution forum held in each 4 villages by 4Q and another by 8Q
Activity 2.1.2 Work with partners to develop education and awareness module on freshwater ecology for implementation throughout Sabah	Education and awareness syllabus including activities and materials developed by the end of 6Q
Activity 2.1.3 Publish articles in peer-reviewed journals	At least 2 peer-reviewed journal articles submitted by the end of 8Q
Activity 2.1.4 Publish articles in local and national newspapers raising awareness of the threats to native fish diversity as well as potential solutions	At least 1 article published by the end 4Q and another by 8Q
Objective 2.2 Improve capacity of local communities for local level monitoring and management of riverine resources	
Activities	Output
Activity 2.2.1 Train and involve local communities in fish sampling, water quality monitoring and riparian habitat assessment activities	At least 2 community members from each of 4 villages trained and conducting fish and water quality sampling by 3Q
Activity 2.2.2 Develop procedure and reporting chain to allow for local community members to document and report instances of pollution	Documenting and Reporting Pollution: <ul style="list-style-type: none"> • Testing parameters and other necessary inputs (e.g. GPS location, photographs) determined by the end of 3Q; • Procedure developed for reporting point and non-point source pollution instances developed by the end of 3Q; • Reporting chain identified and tested by the end of 7Q
Activity 2.2.3 Train local community members to document and report instances of pollution	At least 2 community members from each of the 4 villages trained by the end of 4Q
Activity 2.2.4 Conduct village level forum discussing threats to native fish populations and river health to determine local level conservation actions and draft implementation strategy for village level implementation, and other recommendations	Local-level conservation actions for conserving fish populations and draft implementation strategy agreed upon in 4 villages by the end of 8Q
Activity 2.2.5 Produce results and general recommendations for government and industry (to be refined at later stage with relevant stakeholders)	Report compiling results, recommendations, and proposed activities presented to relevant government departments by the end of 8Q
Activity 2.2.6 Design and test methodology for long-term monitoring of fish species (identified under Objective 1.4) implementable by local communities	Methodology for long term monitoring of fish species developed by the end of 7Q