

# 從溪流海洋探索生命價值 潮浪拍岸 見生命律動

## The Rhythm of Life in the Sound of Waves

Explore the Value of Life through Streams and Oceans

人類探索其他星球有無生命，首先觀察的是什麼？沒錯，就是看上面有沒有水。相對的，我們的地球表面有70%為海洋所覆蓋，是一個藍色的水球，在宇宙中，不但美麗迷人，更孕育展現了無比的生機，非常神奇的，人體中水所佔的比例，也是70%。

水是生命的發源地，地球上最早的生命，來自於35億年前的海洋，經過漫長的演化，有些物種繼續留在海洋或溪流中，有些則逐漸往陸地移動，成為兩棲類或陸地生物。不只人類，哺乳類胚胎時期位於子宮，就是在一個被羊水包圍的環境中長大，扣除掉鹽，深海的成分與羊水非常類似——孕育我們的子宮本身就是一個海洋！

人類雖在陸地上活動，但仍需倚水而居。中國（黃河）、印度（恆河）、埃及（尼羅河）與巴比倫（幼發拉底河和底格里斯河）等4大文明古國的發源，都和河流有密切關係，即使是在深山裡活動的原住民，也要有他們的水源地。

What is the first thing we look for in a planet when searching for alien life-forms? You guessed it – water! 70% of our own planet is covered in water, making this beautiful blue sphere in the universe full of life. Amazingly, 70% of our body is also consisted of water.

Water is the origin of life. Life on earth started as early as 3.5 billion years ago from the ocean. After lengthy evolution, some species stayed in oceans or rivers, while some moved landward and became amphibious or land animals. Mammals, including humans, are surrounded by amniotic fluid in the uterus. If we discount salt, the ingredients of deep seas are actually very similar to amniotic fluid – the uterus that nurtures us is like a sea!

Although living on land, humans must still live by water. The four ancient civilizations, China (the Yellow River), India (Ganga), Egypt (Niles), and Babylon (Euphrates and Tigris) are all closely related to rivers. Even the aborigines who live in mountains must have their water sources.

人類脫離充滿羊水的母體後，仍需要水才能存活。水不但孕育生命，也支持生命，對其他生物，也是如此。生命起始於海洋，部分往陸地發展，依據物種特性，在不同的海拔、不同的環境，找到適合自己的棲息之所，這些生物依賴水的程度或許有差別，但都無法完全離開水。

海洋裡到處都是生命，由淺而深，表、中、底各層的生物分佈都不一樣。越底層，生物的活動範圍越小，越接近表層，活動範圍就越廣。在海洋中，珊瑚礁是極具代表性的生態系，其環境條件為淺水域、暖水溫、日照充足與水質清澈，多分布在南北緯25度之內的熱帶海域，因為生物量高、物種豐富，有「海洋的熱帶雨林之稱」。由於水質清澈，容易觀察到有許多色彩鮮豔的魚類和無脊椎動物，是體驗海洋生態之美很好的選擇。但是珊瑚礁也是環境脆弱的地方，太高或太低的水溫，都會造成珊瑚礁的白化現象。

After leaving the uterus full of water, humans still require water in order to survive. Water doesn't just nourish life – it sustains it, and the same goes for all life-forms. Life started from the sea, and some species migrated to land and found their habitats in different places. They may have different degrees of dependency on water, but none can live without water.

The sea is full of life, and the kinds of life forms seen in different depths are different. The life forms in the deeper levels have less space, and those closer to the surface have more space. Coral reefs are a distinguished ecosystem which requires shallow water, warm water, sufficient sunlight, and clear water. They are mostly found within 25 degrees of north/south latitude, and they are known as the "tropical rainforest in the sea" due to their ability to sustain life. Because of the clear water, it is easy to observe the colorful fish and invertebrates, making them the perfect place for making observations. However, the fragile coral reefs are prone to bleaching when water temperature is too low or too high.



溪流與鳥瞰 / 林芳榮攝  
Stream and a bird camera / by Fang-rong Lin



一般來說，不同區域的交界地帶，生態就會非常豐富。如溪流與海洋交接的河口部分，水陸交界的溼地、潮間帶等，以河口為例，因具有淡水與鹹水的中間性質，不但生長植物多樣，也是蝦、蟹、貝類及幼魚的良好棲所，同時吸引更多過境候鳥覓食，形成了一個複雜的生態系。其中，紅樹林就頗具代表性。

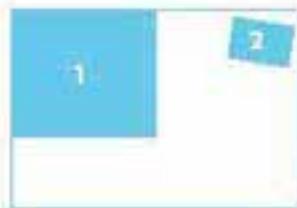
在溪流的中、上游走，水溫越來越低，每段的環境都不一樣，水邊的植相不同，當然水中的生物也不同。

以雪霸國家公園的七家灣溪為例，平均的溫度約16度左右，有國寶魚之稱的櫻花鉤吻蛙，只能生長在這種清冷乾淨的環境中，牠對棲地條件的要求極為嚴苛。相對的，吳郭魚的適應能力就非常強，如果連吳郭魚都活不了，就表示這裡的水污染已經很嚴重了。觀察指標物種，就知道環境哪裡出了問題。

Generally speaking, boundaries of different regions tend to have rich ecosystems, including river outlets, wetlands, and tidal flats. Take river outlets for example, the water has a moderate level of salt, and they are great habitats for plants, shrimps, crabs, shells, and fish. They also attract migratory birds passing by, forming a complex ecosystem. Mangrove is a well-known example.

The temperature of water drops in the mid- and up-streams. Each section has different surroundings, vegetation, and aquatic life-forms.

Take Cijawan Creek in SPNP for example, its average temperature is about 16 degrees, and only Taiwan's treasure, *Oncorhynchus masou formosatus*, can survive in such a cold place. By comparison, tilapia is extremely adaptive, and a water region where they can't survive must be extremely polluted. By examining the indicator species, we can find out the problems with the environment.



1. 綠意盎然的七家灣溪 / 葉晉堯提供 / 俞玲攝  
Euberant Calawan Creek / photo provided by SP NP; taken by Jheng-hao Yu
2. 台灣櫻花鉤吻鮭 / 葉晉堯提供 / 王勝華攝  
*Oxyrinchus masou formosensis* / Photo provided by SP NP; taken by Cing-hua Wang



台灣雖然面積不大，但水中生物卻很有看頭。由於地理位置之故，台灣的東海岸有較溫暖、向北流的黑潮，西岸有低溫、向南流的親潮，冷、暖海流交會混合處，魚種豐富多樣。配合不同的潮流溫度與繁殖期，大量出現的魚種，還形成了所謂的飛魚季、鮪魚季、烏魚季。台灣四面環海，東海沿岸深而垂直，西海岸多沙泥淺灘，南岸則有珊瑚礁，繞一圈，可看到不同的景觀與生態系。再以溪流而言，因為地形及腹地的關係，特徵是長度短、坡度大。從海平面到3,000公尺，因為垂直差異大，往往一條河流的上、中、下游，分別就是不同的海拔，這意味著在很短的距離內，就可以看到明顯的物種變化。

體驗生態美之餘，也要意識到人類開發掠奪帶來的毀壞。溪流與海洋是一體的，她容納萬物，展現生物界最珍貴的多樣性，並呈現一種動態的平衡。大海是所有生命共同的母親，人類和其他生物一樣，來自於她，受其滋養，只是因為演化而呈現不同的生命樣貌。既然共同生活這個大環境下，我們就應尊重彼此的差異及存在的事實，了解萬物「同中存異，異中存同」的道理，對不同的物種，抱持謙卑、保護的態度。

生物與環境是一個相互依存的整體關係，這是大自然的法則，讓我們在母親的懷抱下，好好和巖共存吧！

Although Taiwan is small, it has exciting aquatic species. Due to the geographical qualities, Taiwan's east coast has the warmer Japan current that flows northward, and the west coast has the colder Oya current that flows southward. The regions where the cold and warm currents meet enjoy rich and diverse fish species. With different temperature and breeding periods, we even have the "flying fish season," the "tuna season," and the "mullet season." Being surrounded by water at all four fronts, Taiwan's deep and straight east coast, muddy west coast, and south coast of coral reefs offer diverse views and ecosystems. In terms of streams, they are short and steep due to Taiwan's terrain, with great height differences. A stream's up, mid, and downstream could be located in different elevations, suggesting great species changes within short distances.

We must keep in mind how mankind has destroyed nature due to development. Streams and oceans are a unity that accommodates all life forms and provides a dynamic balance. The sea is the mother to all species, and we humans are not any difference, except for our unique appearances because of our evolution process. Since we are all living on planet earth, we should learn to respect our differences and accept the fact that we all exist, as well as different. We should respect and protect species other than ourselves.

Life forms and the environment cannot be independent from each other, and this is the law of nature. Let us coexist in harmony under Mother Nature's embrace.



### 張崑雄教授小檔案 About Prof. Kun-hsiung Chang

東京大學農學博士、專攻海洋生物資源永續利用。先後工作於台灣大學與中央研究院，曾擔任中山大學海洋生物研究所所長、海洋資源學系系主任及海洋科學學院院長等職。是國內海洋生物研究上最權威的人物。除了學術上向人無雙外，還協助政府進行資源相繼及共享政策之擬定，並藉由民間團體協會、自然科學博物館學會的成立，積極推廣生態保育觀念。

Dr. of Agriculture, Tokyo University (major in sustainable utilization of marine biological resource). Worked in/as NTU and Academia Sinica, dean of Institute of Marine Biology (IMB/ASU), Dean of Institute of Marine Resources, and Dean of Marine Sciences. A pioneer in Taiwan's marine biology research, Chang has trained numerous scholars, helped the government conduct relevant administrations, and promoted conservation by establishing the Society of Streams and Chinese Society of Historical Photography.