

柴山多杯孔珊瑚不能被降級的五個理由

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2017年5月1日農委會林務局正式公告柴山多杯孔珊瑚為野生動物保育法下的一級保育類動物。同年6月在台灣中油要開發成第三然氣接收站的桃園大潭藻礁發現其蹤跡之後，在同月的環差審查會議上立刻引來台灣中油顧問學者提出「降級」柴山多杯孔珊瑚的說法。「降級說」儼然引發保護大潭藻礁團體的撻伐，但是作為台灣海洋野生動物保育名錄中唯二的一級保育類珊瑚，為何無法降級？本文試著整理從1990年首次在高雄柴山海域發現此種多杯孔珊瑚所收集的資料，特別是過去這兩年在大潭藻礁對柴山多杯孔珊瑚進行詳細的野外調查結果，提出柴山多杯孔珊瑚不能降級的理由：

一、石珊瑚分類與演化上的重要性。柴山多杯孔珊瑚在分類上是屬於葵珊瑚科、多杯孔珊瑚屬的石珊瑚。多杯孔珊瑚屬目前已有22種被命名的物種，而大部份的物種都是生活在較深水域無共生藻共生的「非造礁珊瑚」，柴山多杯孔珊瑚是目前已知分佈水域最淺且是唯一具有共生藻共生的造礁多杯孔珊瑚。研究顯示現在分佈在熱帶淺水域的造礁珊瑚的起源可能是來自深海的非造礁類的石珊瑚，因此，柴山多杯孔珊瑚這樣特殊的生活史特徵是提供研究石珊瑚演化起源的好材料。

二、紀錄台灣海峽珊瑚群聚的起源。台灣海峽的澎湖群島和北海岸都有「非礁型」的珊瑚群聚發育，相對於台灣島的墾丁或是小琉球發育典型珊瑚礁發育時間較早，出現的時間約在12000年前最後一次冰期海平面上升之後。根據科博館王士偉老師的研究，早期台灣海峽出現的石珊瑚都是屬於能夠生活在沈積物較高，水較為混濁小型物種。柴山多杯孔珊瑚生活史的特徵，包括可以從直徑0.3公分的單體珊瑚長到直徑超過1公尺的超大群體、同時可以有共生藻或無共生藻共生的「兼性共生」、可以生活在藻礁潮間帶到亞潮帶上部水域混濁、擾動大的棲地，這些都是呈現出台灣海峽早期珊瑚群聚以及珊瑚礁起源以及發育的狀態。進一步研究柴山多杯孔珊瑚的各項生態與生理適應，可以提供台灣海峽珊瑚群聚如何起源的相關資訊。

三、顛覆大型石珊瑚只出現在「水清、貧營養鹽」海域的概念。一般生活在熱帶與亞熱帶淺水區的造礁珊瑚，其主要的環境特徵是水清與貧營養鹽的海域。充足的陽光提供珊瑚體內共生藻行光合作用，而藻類可以很快速的消耗掉水中的營養鹽，使得珊瑚礁區水色保持清澈，很多石珊瑚就可以長成大型的群體。而且一般大型石珊瑚是無法長在被沙洲圍繞的環境，因此，在大潭藻礁G2潮位-225區沙洲發現多個群體直徑接近一公尺的柴山多杯孔珊瑚，不僅顛覆過去對於石珊瑚只出現在水清貧營養鹽的概念，更顯示柴山多杯孔珊瑚已經適應在大潭藻礁這樣的環境。

四、大潭藻礁柴山多杯孔珊瑚族群是僅存最大族群。柴山多杯孔珊瑚模式地點高雄港二港口的礁石區與柴山山腳下潮池區的族群，都已經因為西仔灣停車場開發與中山大學外離岸護堤建設幾乎消失。過去兩年在在大潭藻礁所發現數量與群體大小都指向此區域的柴山多杯孔珊瑚族群是最為健康與穩定的。

五、柴山多杯孔珊瑚的保育是台灣珊瑚與珊瑚礁保育的定海神針。柴山多杯孔珊瑚是唯一以台灣地名命名的石珊瑚，與以台灣島命名的福爾摩沙偽絲珊瑚都已被收錄到世界海洋生物名錄中(www.marinespecies.org)。這兩種珊瑚同為野生動物保護法唯二的一級保育類珊瑚。面對全球氣候變遷，世界各國無不卯足全力保育珊瑚和珊瑚礁，例如美國在 2012 年將 20 種在其國家海域境內的石珊瑚列在瀕危物種法下受威脅的珊瑚物種。因此，全力保育柴山多杯孔珊瑚，確保目前唯一的大潭藻礁棲地的完整性，是推動台灣珊瑚與珊瑚礁保育的重要指標。

Five reasons why the conservation status of Taiwanese coral, *Polycyathus chaishanensis*, cannot be downgraded

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Taiwanese coral, *Polycyathus chaishanensis*, was declared as a highly-endangered species by the Wildlife Act on May 1, 2017. On June, this species was discovered in the Datan algal reef, Taoyuan where is assigned as the construction site for a liquified natural gas receiving and storage terminal by Taiwan Chinese Petroleum Corporate (CPC). Ironically, it has been proposed by the CPC's consultant that conservation status of *P. chaishanensis* should be downgraded in order to pass the environmental impact assessment between pre- and post-development activity. This fallacy is strongly challenged by the conservationists' outcry. In this report, I review the scientific information of *P. chaishanensis* collected since 1990 with an emphasize on the effort we devoted in the past two years, and summarize 5 major arguments why the conservation status of *P. chaishanensis* cannot be downgraded.

1. Key characteristics to reveal Scleractinian systematics and evolution. *Polycyathus chaishanensis* belongs to the family Caryophylliidae, a group of scleractinian corals composed of most azooxanthellate species from deeper water. Amongst the twenty-two species in genus *Polycyathus*, *P. chaishanensis* is the only species that is found in the intertidal sand flat to upper sublittoral and expresses a facultative symbiosis with photosynthetic algae. It has been suggested that the shallow-water scleractinians are evolved from azooxanthellate ancestors in the deepwater. *P. chaishanensis* provides key characteristics for us to understand the evolutionary history of scleractinians.

2. Understand the origin of coral community in the Taiwan Strait.

Nonreefal coral communities along the north coast of Taiwan and Penghu Islands were developed since at least 6000 yrs after sea level rising back to the current level in the Taiwan Strait. According to the studies by Dr. Shih-Wei Wang in the National Museum of Natural Science, only those coral species that tolerate the highly-sedimented can survive in the paleoenvironment of the Taiwan Strait. *Polycyathus chaishanensis* has the life history characteristics that adapt to highly-turbulent environment in the Datan algal reef. This provides an ideal model system to study ecophysiology of those coral species that adapt to early paleoenvironment of Taiwan Strait.

3. Challenge the concept of large reef-building corals existing only in oligotrophic and clear water.

Scleractinian corals build reefs at the tropical shallow water where is characterized by oligotrophic and transparent water. Corals can therefore grow into large colonies in the tropical

reefs by the nutrient provided from the symbiotic algae. Finding large colonies of *Polycyathus chaishanensis* surrounded by sand dome in Datan algal reef is not only showing this species already adapts to the highly-turbulent environment, but also challenging the concept that large reef-building corals exists only in oligotrophic and clear water.

4. *Polycyathus chaishanensis* in Datan algal reef is the only existing large and health population.

Due to the construction of park lot and offshore jetties in the holotype locality and nearby population in Chaishan, Kaohsiung, the originally-described population of *Polycyathus chaishanensis* is already disappeared. In the last two years over 80 colonies were found in the Datan algal reef with the colony large than 100 cm in diameter. More colonies are expected to be discovered through more intensive survey. This confirms that *P. chaishanensis* in Datan algal reef is the only large and health population in Taiwan.

5. Conservation of *Polycyathus chaishanensis* is the showcase for determination of coral reef conservation in Taiwan.

Polycyathus chaishanensis and *Pseudosiderastrea formosa* are two new coral species named after Taiwan and listed as highly-endangered species by the Taiwan Wildlife Act. Both species are also listed by the World Register Marine Species (www.marinespecies.org). As impact by local disturbances and climate change are expected to increase in the future, more corals are facing local extinction and coral reef ecosystem are also disappearing. More coral species are needed to be considered for its vulnerability and protected by Taiwanese legislation. For example, 20 species of corals are listed as threaten species by the Endangered Species Act in the US. Thus, protecting *P. chaishanensis* and its habitat such as Datan algal reef from extinction will be the case to show the determination of our government to protect corals and coral reefs in Taiwan.