

水土不可分

流域治理與河川環境規劃設計

Watershed & River Ecosystem Governance

授課老師: [廖桂賢](#) / 都市計劃研究所教授

上課時間: 原則上每週三下午 3:30-6:00, 校外教學安排於週末

教室: 公共事務學院 630

教學助理: 許凱盛 / 都市計劃研究所碩一生 kaisheng689@gmail.com

課程簡介

無論是大河小溪，在人類社會、經濟、文化發展上都扮演重要角色。然而，社會大眾普遍不了解河川生態健康對社會經濟發展的重要性，包括河川生態系服務在氣候變遷減緩與調適上的潛力。河川不是被視為應盡可能利用之水資源，就是應以工程整治之禍源，因此，河川相關事務（水患治理、水資源利用、水污染處理等）在台灣被過度簡化為「水利工程」課題，且事權分散，亦尚未出現河川生態保育與河川復育之積極政策。然而，水土無法截然二分：一方面，河川相關事務需著眼宏觀之流域尺度，不同議題亦得綜合考量；另一方面，任何尺度的空間規劃都必須考量現有之河川溪流之動態。在生物多樣性嚴重流失、氣候變遷事態愈來愈緊急的世界中，解決環境問題需要跨領域知識整合與跨部門分工合作，河川之治理亦然，需要空間規劃專業者積極投入。本課程透過講座與課堂討論，輔以校外走讀，讓學生認識流域與河川治理相關課題並學習新觀念，以期未來在空間規劃中納入相關考量，以協助提升台灣流域與河川之健康。

教學目標 學生修習本課程後將預期能夠：

1. 認識流域與河川相關基本知識
2. 體認河川健康對人類社會、經濟、文化發展之重要性
3. 認識流域與河川治理之相關事務，包括水患治理、生態保育與復育等
4. 理解流域與河川治理之相關新概念與作法，包括自然解方

指定讀物

- 廖桂賢，2017。第三部〈與水和平共存不是夢想〉，第 90~133 頁，《好城市：綠設計，慢哲學，啟動未來城市整建計畫》。台北：野人出版社
- 廖桂賢，2023。第六部〈從空間規劃專業拆解社子島開發問題〉。廖桂賢主編，《城中一座島：築堤逐水、徵土爭權，社子島開發與臺灣的都市計畫》春山出版社

授課時間表與參考讀物

9/10 教師國外開會，併入第二週進行

9/17 講座 課程簡介 + 相關名詞與基本觀念

- 讀物
- [Free-flowing rivers are the freshwater equivalent of wilderness areas](#). WWF
 - Ganey S, Surrier L. 2022. [8 benefits of healthy, free-flowing rivers](#). Pew.

9/24 講座 河川水文與河川生態基礎知識

陳嘉修 / 野聲環境生態公司經理

- 讀物
- [The water cycle | Ecology](#). Khan Academy
 - [Our Planet | Fresh Water](#). Netflix

10/01 講座 河川生態系服務 + 流域治理規劃

- 讀物
- Petsch DK, de Mello Cionet V, Thomaz SM, dos Santos NCL. 2022. Ecosystem services provided by river-floodplain ecosystems. Hydrobiologia. <https://doi.org/10.1007/s10750-022-04916-7>

10/08 講座 以河相學認識台灣的河川型態

郭鎮維 / 中興工程顧問公司園區及路航工程部國土永續中心工程師

- 讀物
- 楊佳寧、郭鎮維、游牧笛、沈淑敏，2022。臺灣河川流域區、地形分段與類群建構與分析。中華水土保持學報，53(1): 13-24

10/15 講座 流域治理規劃

10/19 走讀 **自然溪流探索**

(日) 洪諭瑩 / 台灣河溪網協會研究員

- 讀物
- 農業部林業及自然保育署，2023。林業保育署公共工程生態友善機制手冊。附件三：野溪治理工程生態追蹤評估指標
 - [Rapid biological assessment protocols: An introduction](#)

10/22 講座 河川之生物化學及其治理 + 生態檢核

黃于玻 / 觀察家生態顧問公司總經理、生態專業技術服務同業商業公會理事長

10/29 改為 11/15 校外走讀

11/05 講座 水患治理的過去與現在

王順加 / 以樂工程顧問公司總經理

- 讀物
- 廖桂賢，2025。什麼是水患治理？(上)(下)聯合報《河好如初》
 - 廖桂賢，2018。極端氣候下的水患治理：先丟棄「快速流下主義」！鳴人堂
 - 廖桂賢，2014。水患不能只是工程的問題 - 關於淹水，我們找對方向了嗎？鳴人堂

11/12 講座 永續雨水逕流治理

	讀物	• Liao K-H, Deng SN, Tan PY. 2017. Blue-green infrastructure: New frontier for sustainable urban stormwater management. Chapter 10 (p.203-226) in Tan PY, Jim CY, editors. Greening Cities: Forms and Functions. Springer Nature Singapore Pte Ltd, Singapore.
11/15 (六)	走讀	多功能滯洪池 中和壽德公園：新北市水利局 內湖金瑞治水園區：台北市水利處、王力平 / 羽林生態公司董事長
11/19	講座 讀物	韌性理論應用於水患治理：承洪韌性 • 廖桂賢。2025。什麼是承洪韌性？（上）（下）聯合報《河好如初》 • 廖桂賢。2021。不怕水淹，更要與洪水共生！打造具有「承洪韌性」的城市培養指南。台北村落之聲 • 廖桂賢。2021。打造一個「淹水也讓人喜歡的韌性聚落：掌潭村的耐淹規劃。眼底城事
11/26	講座 讀物	河川復育 • Wohl E, Lane S, Wilcox AC. 2015. The science and practice of river restoration. Water Resources Research 51: 5974-5997 • 廖桂賢、劉長青、劉昌學。《台灣河川溪流復育設計指引 1.0》台灣河溪網協會、生態專業技術服務商業同業公會、景觀學會 • 廖桂賢。2018。台灣都市河川的前瞻想像。《水資源管理會刊》第 20 卷第 2 期，第 40-49 頁
12/03	講座 讀物	水患治理之自然解方 + 空間式水患治理 • 廖桂賢。2025。水患治理的自然解方：如何利用自然降低水災風險？《自然保育季刊》130 期 • 廖桂賢、鄒明軒。2023。台灣推動水患治理自然解方的挑戰與建議。水資源管理會刊第 25 卷第一期，第 11-21 頁 • A new type of river management is coming! • The Wildlife Trust: How nature can help prevent flooding
12/10	講座	水環境改善之空間規劃 劉長青 / 台灣河溪網研究員、眾森自然工作室共同創辦人 河川申請保育共生地 (OECMs)：從國際倡議到在地實踐 楊博安 / 觀察家生態顧問公司綠能永續部副理
12/17		改為 12/20 校外走讀
12/20 (六)	走讀	都市水環境改善實例 劉柏宏 / 經典工程顧問公司主持人
12/24	討論	期末綜合討論

課堂規定

1. 盡可能出席每一堂課，且務必提前或準時到堂，以尊重授課老師與其他同學。**比授課老師晚到五分鐘以上，請勿進入教室**，除非事先提供正當理由。若上課當天遇不可抗力之理由，仍可進教室，但課後請向授課老師說明遲到原因。
2. 請於每週上課前先行閱讀完畢上表所列之參考讀物。
3. 課堂參與對於學習至為重要，請積極回答老師的提問，並主動提問。任何關於講座之問題，請於上課時提出；除非有特殊理由，不接受下課後才提出之問題。
4. 勿在課堂上趴下來睡覺。如果真的很睏，歡迎到教室外呼吸新鮮空氣後再回來。
5. 一心多用極可能一事無成。請參考“[Students think they can multitask. Here's proof they can't](#)”一文。因此，除非教學活動需要，上課原則上禁止使用手機，且勿將手機放桌上，
6. 請以紙筆做筆記，不要用筆電。打字的聲音會干擾授課老師與其他同學，且用筆電做筆記的學習效果遠不如用紙筆好，請參考“[A learning secrete: Don't take notes with a laptop](#)”一文。若因特殊原因必須使用筆電做筆記，可與授課老師討論。
7. 期末作業遲交三十分鐘以上以零分計算。有不可抗力之理由，事前必須與授課老師討論。

評量方式

30% 課堂參與：本課程每堂課（包括校外走讀）均有討論環節，同學應積極發言參與討論。

70% 期末報告：請選擇一個流域做「流域整體規劃」，都市與鄉村地區皆可，河川規模與流域範圍不宜太大，以免難以掌握。此流域整體規劃並無樣板，請根據所學自由發揮，盡可能創新，結合課堂上所學之國際前瞻思維，但請滿足以下要求：

- 所設定之計畫目標應包含（但不限於）河川健康之保育或復育
- 盤點流域/河川面臨之課題並且呈現基本圖資
- 無需繳交文字報告，請以清楚易懂之文圖並茂文件（類懶人包模式）呈現規劃成果
- 報告請勿超過二十五頁，應於 12/21 早上八點前傳給全班同學，12/24 由各組相互評論，因此請確保報告清楚易懂。

參考讀物

綜合

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- Global Water Partnership. 2021. [Integrating data to improve the protection and restoration of freshwater ecosystems](#)
- The Federal Interagency Stream Restoration Working Group. 1998. [Stream Corridor Restoration: Principles, Processes, and Practices](#)

河川水文與生態基礎知識

台灣河川棲地

- [導讀河溪](#)

河川生態系統過程

- Von Schiller D. et al. River ecosystem processes: A synthesis of approaches, criteria of use and sensitivity to environmental stressors. Science of the Total Environment 596-597: 465-480.
<https://doi.org/10.1016/j.scitotenv.2017.04.081>

The river continuum concept

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- 方偉達、周睿鈺。2005。河川續動與洪泛脈動：探討河域生態學之演進觀念。國立台灣大學建築與城鄉研究學報，第十四期，第 69-80 頁。

The flood pulse concept

- Junk W, Bayley PB, Sparks RE. 1989. The flood pulse concept in river-floodplain systems. Pages 110-127 in D.P. Dodge, ed. Proceedings of the International Large River Symposium (LARS). Canadian Special Publication of Fisheries and Aquatic Sciences 106.
- Tockner K, Malard F, Ward JV. 2000. An extension of the flood pulse concept. Hydrological processes 14(16-17): 2861-2883.

Natural flow regime & Ecohydrology

- Poff NL, Allan JD, Bain MB, Karr JR, Prestegard KL, Richter BD, Sparks RE, Stromberg JC. 1997. The natural flow regime: A paradigm for river conservation and restoration. BioScience 47(11): 769-784.
- Naiman RJ, Latterell JJ, Pettit NE, Olden JD. 2008. Flow variability and the biophysical vitality of river systems. Geoscience 340: 629-643.

Nutrient spiraling

- Newbold JD, O'Neill RV, Elwood JW, Winkle WV. 1982. Nutrient spiraling in streams: implications for nutrient limitation and invertebrate activity. The American Naturalist 120(5): 628-652. <https://doi.org/10.1086/284017>
- Ensign SH, Doyle MW. 2006. Nutrient spiraling in streams and river networks. Journal of Geophysical Research: Biogeosciences 111(G04009): 1-13. <https://doi.org/10.1029/2005JG000114>

Floodplains & floodplain rivers

- Tockner K, Bunn SE, Gordon C, Naiman R, Quinn G, Stanford JA. 2008. Flood plains: critically threatened ecosystems. In Polunin N, ed. Aquatic Ecosystems. Cambridge University Press.
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The serial discontinuity concept

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Biodiversity

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Riparian zones

- Naiman RJ, Decamps H. 1997. The ecology of interfaces: Riparian zones. Annual Review of Ecology & Systematics 28: 621-658.
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Fluvial geomorphology

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河川生態系服務

- Lynch AJ et al. 2023. [People need freshwater biodiversity](#). WIREs Water e1633.
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棲地與評估

- 陳志豪、林琳、鄧信彥、錢欣、蔡佳育。2025。《[物有所棲：臺灣棲地圖鑑](#)》中國民國生態專業技術服務商業同業公會
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河川連結性與其管理

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河川管理思維與政策

- 孫建平。2016。《[水與生活：水資源管理與生態環境](#)》。科學發展 520 期: 16-21
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河川復育

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都市河川復育

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水患治理

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承洪韌性

- 廖桂賢 · 2025 · 什麼是承洪韌性？ ([上](#)) ([下](#)) 聯合報《河好如初》
- 廖桂賢 · 2021 · [不怕水淹，更要與洪水共生！打造具有「承洪韌性」的城市培養指南](#) · 台北村落之聲
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