Brightwater

State of the art wastewater treatment

污水處理

And Community Education facility

社區教育機構

In 2012 we received the contract to offer education programs at the newly opened Brightwater Treatment Center.

我們在2012年得到提供教育課程在新成立的Brightwater處理中心的合約

King County takes a small portion out of every ratepayer dollar to support education.

金縣提出地方納稅人的稅收一小部分，來支持這個教育課程

Brightwater Center – King County Water Treatment Center

Brightwater became another amazing setting for us to provide environmental education

educationBrightwater 成為另一個能提供環境教育的驚人地點

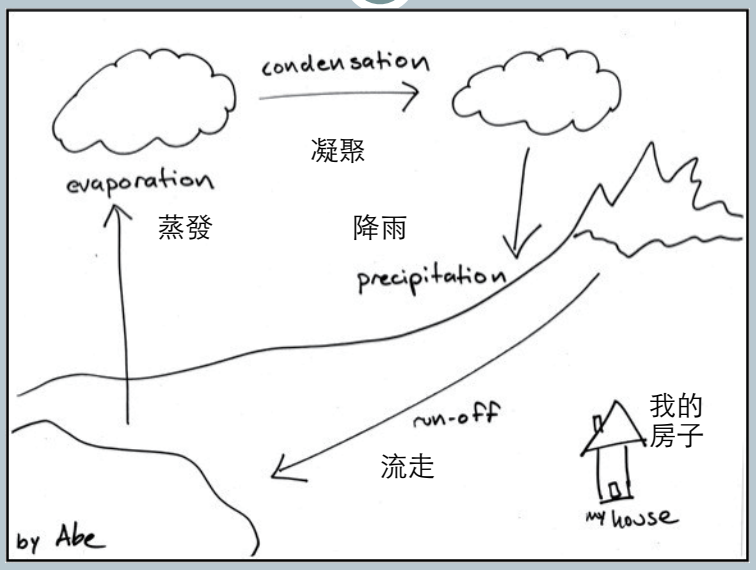
But things changed for everyone when we started talking about the water cycle

當我們開始談論水循環時，對每個人而言，事情開始有了改變

CAN YOU DRAW THE WATER CYCLE?
你可以畫出水的循環嗎？

NOW CAN FIT YOUR HOUSE INTO THE WATER CYCLE?
你現在如何把你的房子安排在水的循環當中?

How do we connect to our water?
我們如何和水聯結？



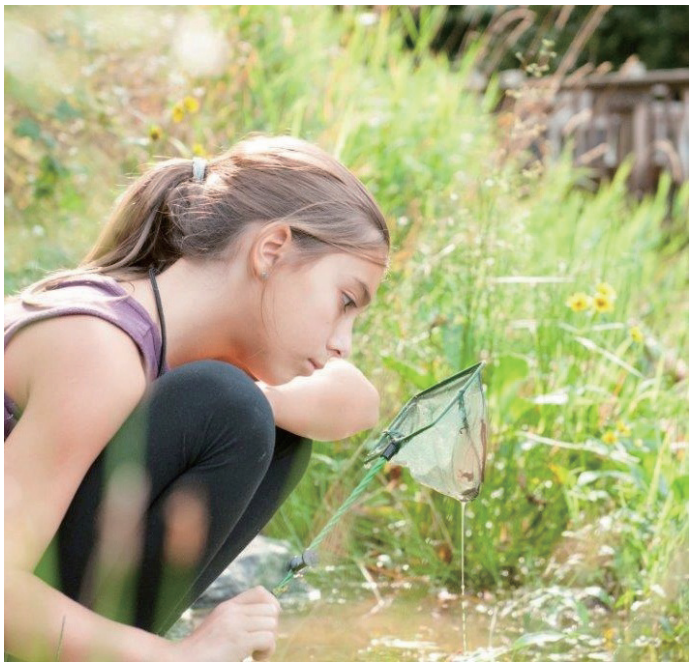
This points to a problem and an opportunity
這指出了一個問題，同時也是一個機會

In 2012 69% of United States graduating seniors did not meet proficiency levels in science.

在2012年，69%的美國大學生畢業並未達到應有的科學程度

What role can we play in making environmental science meaningful for our students?

我們能在使學生了解環境科學意義當中，扮演什麼角色?



Our ideas about water study (and environmental education) began to change

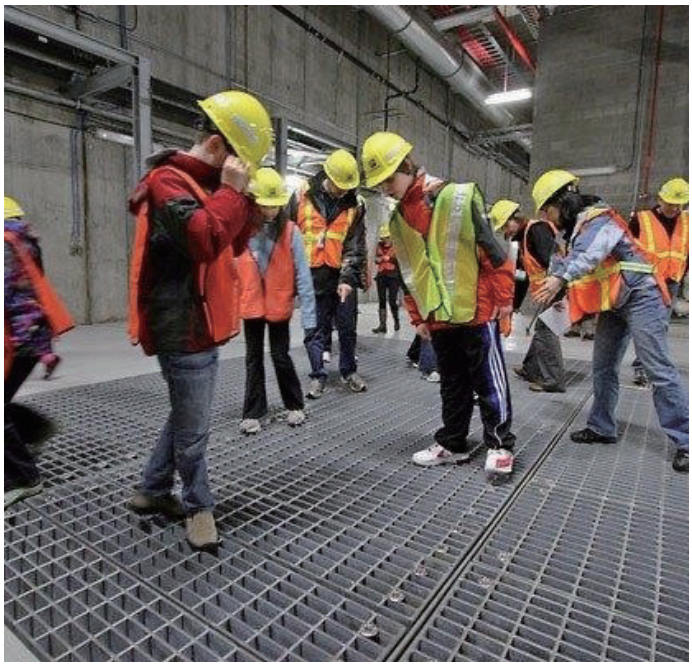
我們在關於水教育(和環境教育)開始改變

Exploring the underground river

探索地底下的河流

We started thinking differently about how community infrastructure could become a context for understanding science, ecology and personal responsibility

我們開始用不同的角度思考如何讓社區基礎結構能變成了解科學，生態學和個人責任的教學內容。



At Brightwater

Students explore the surprising limitations of one of the most advanced water treatment facilities in the United States.

學生們探索美國驚人和最先進的處理污水機構

And how they can help.

和他們可以如何幫助

Connecting water study to stewardship.

聯結水教育和管理工作

This new program changed *our* thinking about the role of our work 新課程改變我們關於工作角色的想法

- We have developed more strategies for connecting our programs to nature in urban areas. 我們已經發展出更多的策略，為了讓我們的課程能在都市中呈現自然
- We're connecting more our programs across the curriculum.我們讓課程聯結更多活動

And we are about to launch a new graduate programs focusing on urban environmental education.我們將展開一個研究生級課程，目的是聚焦在都市的環境教育

Developing educators who can use their community as a context for teaching and learning. 開發出那些能利用他們的社區當作文本來教學的教育家

Masters of Arts in Education with a concentration on Urban Learning
教育文學碩士專注於城市學習中

We are excited about the possibilities
我們對於可能性感覺到興奮

As we consider how to make environmental education more relevant for our students and community.

我們思考著如何使環境教育和我們的學生和社區有更多的相關

Questions…
問題

日本 Project WET 在地化工作坊推廣過程與未來校園課程發展規劃

The Localization case on Project WET material and workshop model, and Futuredevelopment targeting school curriculum

一、講者：菅原一成 （KAZUNARI SUGAWARA ）

日本河川集團 - 日本 Project WET 副召集人。畢業於東京學藝大學，擁有 Project WET Facilitator、Project WILD Educator、Project Learning Tree Educator、RAC Trainer、NEAL Trainer (CONE Trainer)、Rescue3 Swift Water Rescue Technician1、Second-class Architect 等多項資格。從 2002 年開始投身於河川環境教育，除了是日本 Project WET 副召集人，同時也是河川集團內兒童教育方案的研究人員，擁有豐富的推廣經驗。近年除了在日本推廣演講之外，也到美國、韓國等地方以講座的方式與其他人分享他的水資源教育相關經驗。

二、摘要：

介紹河川集團如何將 Project WET 的課程轉換為適合日本的課程，像是將課程教具開發為適合學校教育所使用等，以及水資源教育研習營的推廣模式。也更進一步的希望能將此套教育模式帶入校園提供給教學現場的教師所使用。

The Localization case on Project WET material and workshop model, and Future development targeting school curriculum

Project WET教材及工作坊的本土應用實例，以學校課程為本的未來發展

Kazunari SUGAWARA
Researcher of
Center for Supporting Children's Waterside Activities,
The River Foundation
Associate Coordinator of Project WET Japan

Project WET Japan

5 contents of this presentation 本演講的主要內容

1	2	3	4	5
Summary	Facilitator Workshop Model	Publication (Guidebook)	Analysis	Next Target
概要	引導師 工作坊模式	教學手冊	分析	下一個 目標

+ Question to Audience

2

Facilitator
Workshop
Model

引導師工作坊
模式

引導師培力工作坊

Facilitator training workshop

2003-2011

- Activity × 4
- Lecture about Project WET
- Peer Teaching

- 活動 x 4
- Project WET 講座
- 同儕教學

- Facilitator handbook
- Q&A about holding workshop

- 引導師手冊
- 有關工作坊帶領的問與答

加入「合作學習」及
「主動學習」概念

Add the ideas of
"Cooperative learning"
& "Active learning"

2012- 作業
(準備及提交8個活動方案)

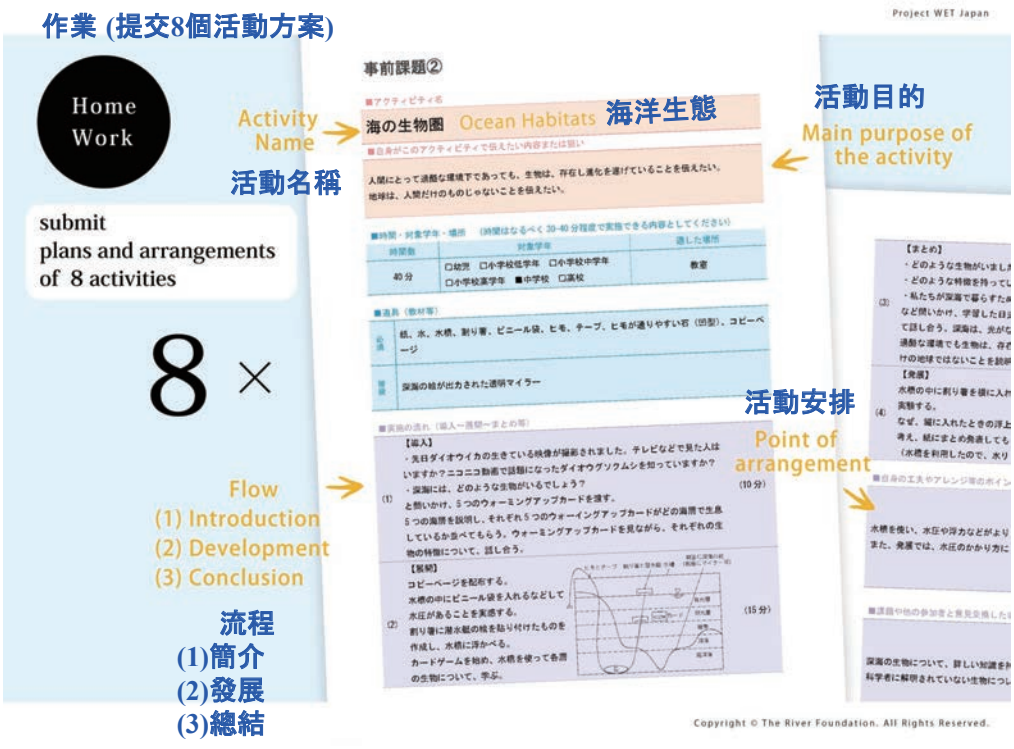
new Home work
(Preparation and submit plans of 8 activities)

- Ice break 破冰活動
- Lecture about Project WET 講座
- Peer Teaching 同儕教學

- Facilitator handbook 引導師手冊
- Q&A about holding workshop
有關工作坊帶領的問與答
+

- One more Peer Teaching new
(Advance) 同儕教學 (進階版)
- sharing of learning new 學習分享
- Lecture about facilitation new
- Visualization of aim and
accomplishment new

- 引導技巧講座
- 目標及願景想像


作業 (提交8個活動方案)
Project WET Japan
Home Work
submit plans and arrangements of 8 activities
8 ×
Activity Name
活動名稱
事前課題②
海の生物圏 Ocean Habitats
海洋生態
活動目的
Main purpose of the activity
Flow
(1) Introduction
(2) Development
(3) Conclusion
流程
(1)簡介
(2)發展
(3)總結
活動安排
Point of arrangement
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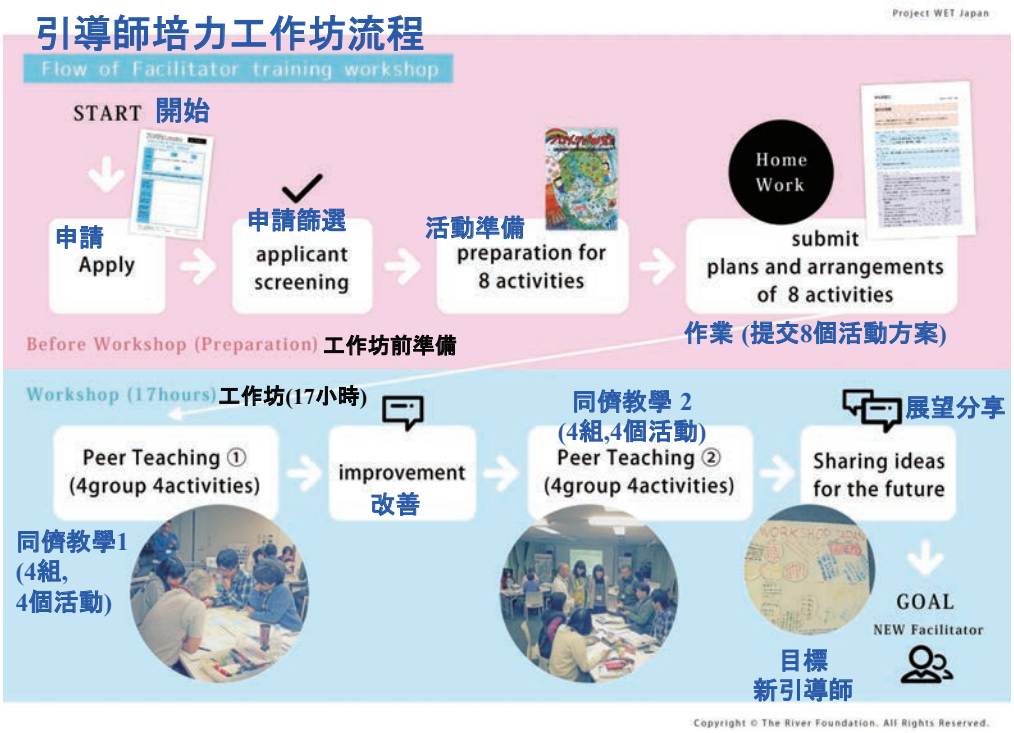
引導師培力工作坊流程
Flow of Facilitator training workshop
Project WET Japan
START 開始
申請 Apply
申請篩選 applicant screening
活動準備 preparation for 8 activities
Home Work
submit plans and arrangements of 8 activities
作業 (提交8個活動方案)
Before Workshop (Preparation) 工作坊前準備
Workshop (17hours) 工作坊(17小時)
Peer Teaching ① (4group 4activities)
improvement 改善
同儕教學 2 (4組,4個活動)
Peer Teaching ② (4group 4activities)
展望分享
Sharing ideas for the future
同儕教學1 (4組, 4個活動)
GOAL
NEW Facilitator
目標 新引導師
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引導師培力工作坊時間表

Time-table of Facilitator training workshop

Day1 第一天

10′	Opening	開始
60′	Ice breaking	破冰活動
10′	Lecture about Project WET	講座
90′	Prepareing Peer Teaching①	同儕教學準備
60′	Lunch	午餐
50′	Peer Teaching①-1	
50′	Peer Teaching①-2	
50′	Peer Teaching①-3	同儕教學
50′	Peer Teaching①-4	
20′	Sharing of learning	學習分享
	有關工作坊帶領的問與答	
20′	Q&A about holding workshop	
60′	Lecture about facilitation	引導技巧講座
90′	Dinner & Prepareing Peer Teaching②	
	晚餐及同儕教學準備	

Day2 第二天

30′	Prepareing Peer Teaching②	同儕教學準備
50′	Peer Teaching(Advance)②-1	同儕教學
50′	Peer Teaching(Advance)②-2	
40′	Lunch	午餐
50′	Peer Teaching(Advance)③-3	
50′	Peer Teaching(Advance)④-4	同儕教學
20′	Sharing of learning	學習分享
30′	Group Discussion	小組討論
	制訂老師工作坊計畫示範	
20′	Demo Planning of educator workshop	
20′	Presentation about the plan	計畫展示
10′	Q&A	問答
10′	Paper Test	測驗
10′	Certification ceremony	證書頒授儀式
10′	Closing	閉幕

Activity 活動　Lecture 講座　Discussion 討論　Preparing 準備

Project WET Japan

3

Publication
(Guidebook)

教學手冊

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教學手冊

Guidebook

教學手冊日語版

Guidebook 2.0 Japanese ver. 2013-

Project WET Japan

活動設計
Development of Activities

Project WET基金會出版超過20本教學手冊及40本兒童活動書，內含超過300個水資源科學教育活動

Project WET Foundation has published more than 20 educators guides and 40 Kids In Discovery series (KIDs) activity boklets containing more than 300 individual water science activities.

Guidebook based on priority topics like Floods, Watershed management, Water Quality.

以洪水、流域及水質為主題的教學手冊

Booklets and Online materials focused on Children

適合兒童的小冊子及網上資源

Project WET Japan

We developed the “Additional Edition” 附加版本

We held Exploratory Committee which includes school teachers and university officials to try new activities.

我們成立了由學校老師和大學職員組成的委員會，設計及試驗新活動


Project WET Japan
Discover a Watershed
The Kisogawa
探索流域
木曽川町
Project WET
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Project WET Japan
木曽川町
The Kisogawa
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《木曾川町教師手冊》以《美國科羅拉多州教師手冊》為藍本

Project WET Japan

" The Kisogawa Educators Guide" is based on" The Colorado Educators Guide"

美國科羅拉多州 The Colorado　　The Kisogawa 木曾川町

	629,100km²	盆地面積 Basin area	About 1/70 9,100km²	
- 流經乾旱的美國西南部及墨西哥西北部 • It run through the arid southwestern United States and northwestern Mexico • About 85% of the Colorado' s water orijinates in the mountains of Colorado • Agricultural zone - 約85%的水來自科羅拉多州山脈 - 農地 "Discover a Watershed : The Colorado Educators Guide"	2,330km	Length of river 河流長度	229km About 1/10	流經日本中部平原，住宅及工業區 • It run through the plain of middle Japan which amassed Industrials, population and property • An area of high rainfall 高降雨量 • The lower area lies below sea level 低窪地區處於海平面以下 "Document from 74th Sub Committee river development project"
		Feature 特徵		

Project WET Japan

Process 過程

政策制訂

Discover a Watershed The Kisogawa Educators Guide Examination Commission

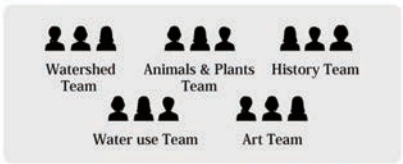
(Academic expert,River administrator,Teachers)

由學者專家、河川管理人及老師組成的委員會

由Project WET引導師及教師組成的工作小組

Discover a Watershed The Kisogawa Educators Guide Working Group

(Project WET Facilitaors and Educators)



12個與自然、動植物、歷史文化有關的活動

12 Activities related to Nature, Flora and Fauna, History and Culture

Project WET Japan


流域介紹
Introduction of Watershed


動植物
Flora and Fauna of Watershed


歷史
History of Watershed


河川管理
Water Management of Watershed


藝術
Art of Watershed

【Activity list】

Introduction	①Seeing Watershed and Blue Beads ②String of Pearls: The Kisogawa Watershed ③Go with the Flow ④Incredible Journey of the Kisogawa
Flora and Fauna	⑤Hunting for Habitats in the Kisogawa Watershed ⑥Chillin' with the Chubs ⑦An Invited Guest in the Kisogawa Watershed
History	⑧Kiso River Timeline
Water Management	⑨Plumbing the Kisogawa ⑩Many Happy Return Flows ⑪Faucet Family Tree
Art	⑫Colors of the Kisogawa

Project WET Japan

Demonstration 示範

An Invited Guest in The Kisogawa Watershed

木曽川町流域的貴賓

Discover a Watershed
The Kisogawa

オオキンケイギク 金雞菊
Ohkinkeigiku
(Lanceleaf tickseed)

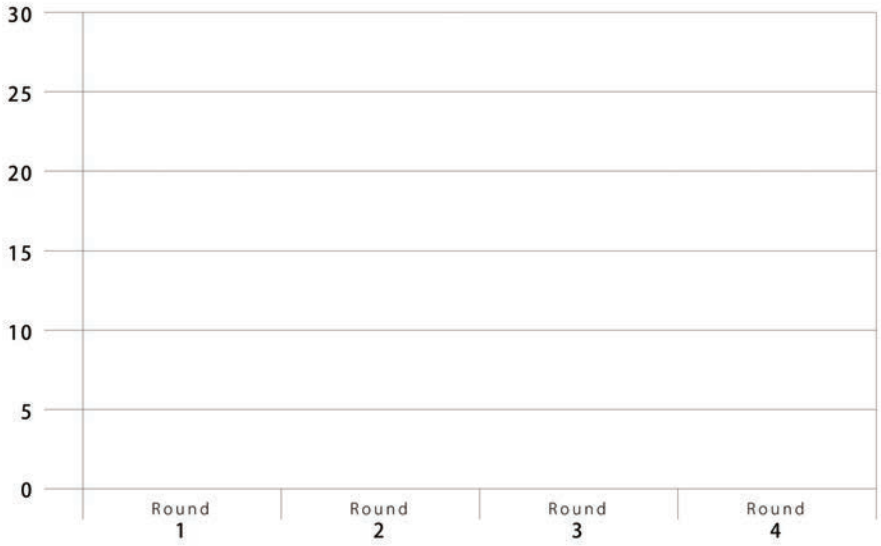
カワラナデシコ（河原撫子）
Kawara Nadeshiko
(Fringed pink)

Project WET
Demonstration
An Invited Guestin The Kisogawa Watershed
Discover a Watersh
The Kisogawa

Project WET Japan

Demonstration
An Invited Guestin The Kisogawa Watershed

Discover a Watershed
The Kisogawa



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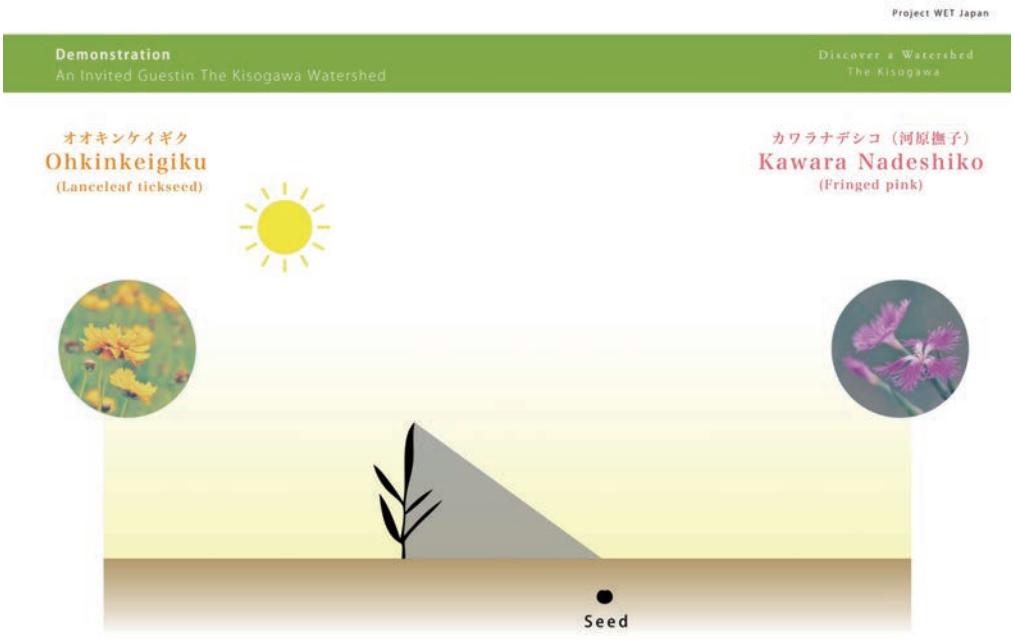
Demonstration
An Invited Guestin The Kisogawa Watershed

Discover a Watershed
The Kisogawa

オオキンケイギク 金雞菊
Ohkinkeigiku
(Lanceleaf tickseed)

カワラナデシコ（河原撫子）
Kawara Nadeshiko
(Fringed pink)

5月至7月	Flower season 花期	6月至9月
5(May)-7(July)		6(June)-9(September)
30-70cm	Tall 高度	30-80cm
外來物種(北美洲) Alien species (From North America)	place of origin 原產地	本土植物 Native vegetation
Very strong and fertile 強壯及繁殖力強	features 特徵	Need light and airy space 需要陽光及通風的環境


Project WET Japan
Demonstration
An Invited Guestin The Kisogawa Watershed
Discover a Watershed
The Kisogawa
オオキンケイギク
Ohkinkeigiku
(Lanceleaf tickseed)
カワラナデシコ（河原撫子）
Kawara Nadeshiko
(Fringed pink)
Seed
種子
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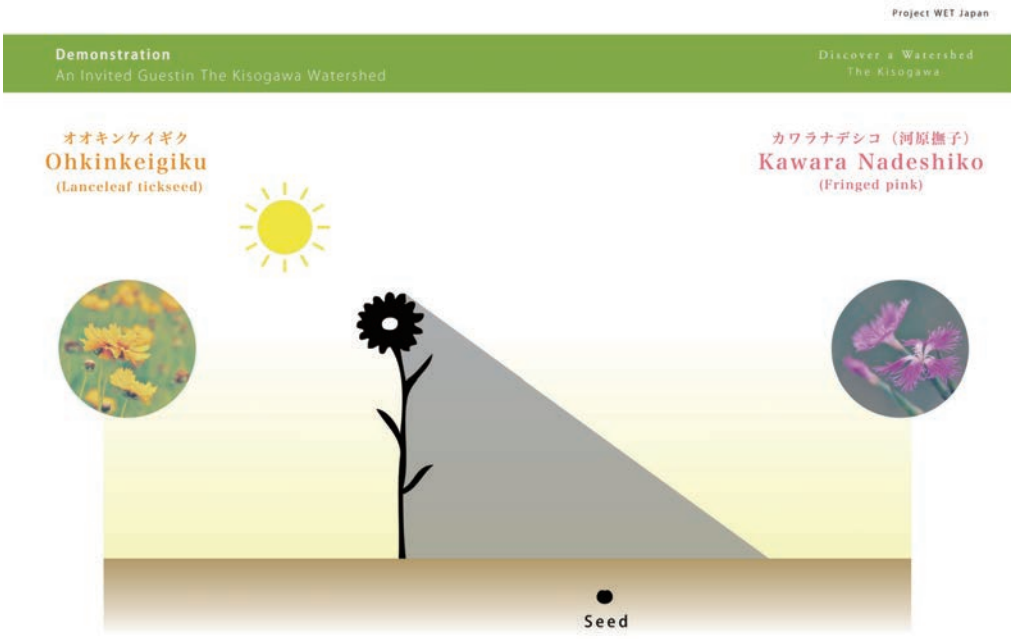
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Demonstration
An Invited Guestin The Kisogawa Watershed
Discover a Watershed
The Kisogawa
オオキンケイギク
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(Lanceleaf tickseed)
カワラナデシコ（河原撫子）
Kawara Nadeshiko
(Fringed pink)
Seed
種子


Project WET Japan
Demonstration
An Invited Guestin The Kisogawa Watershed
Discover a Watershed
The Kisogawa
金雞菊是壞旦嗎？
"Ohkinkeigiku" is BAD GUY ?
1880s
Invited from North America as ornamental plant
從北美洲引進為觀賞植物
1990s
Well-used as afforestation plant
被廣泛用作綠化植物
2006
Regulated under the Invasive Alien Species Act
被列入日本《外來入侵物種法》
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Project WET Japan
例子
Example
The Kisogawa Blue Beads
Students demonstrate the movement of water through The Kisogawa during different seasons by passing beads.
Related Units
Elementary | Social studies | 3-4th | feature of the Prefecture
Elementary | Science | 5th | The working of flowing water
學生傳遞小珠子，象徵木曽川町河水在不同季節的流動
河川上游
Headwaters
河川上游
Headwaters
Main stem
主流
tributary
支流
Main stem
主流
Ise Bay
伊勢灣
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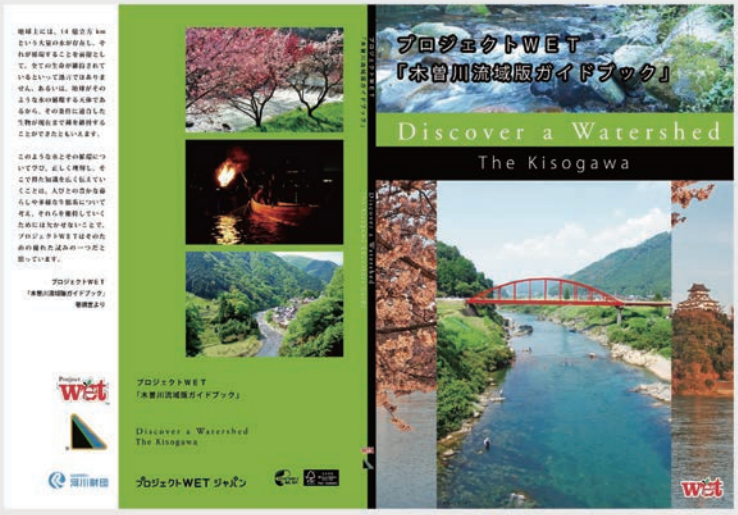
首個在日本應用的Project WET教材

The first localized Project WET material in Japan



4

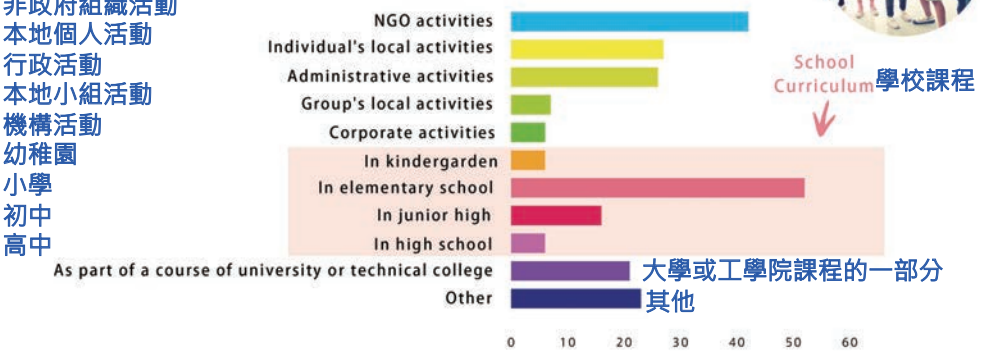
Analysis

分析

教師活動調查 2012

Survey of Educators' activities 2012 N=241

Project WET Japan



Opportunity for performing activity

執行活動的機會

教師活動調查 2012

Survey of Educators' activities 2012 N=241

Project WET Japan

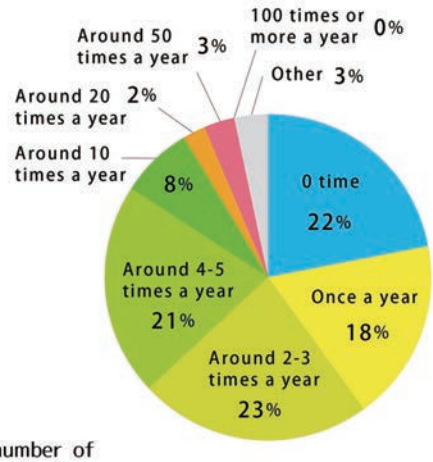
The medium of knowing about Project WET first time

首次接觸Project WET的媒介

教師活動調查 2012

Survey of Educators' activities 2012 N=241

Project WET Japan



The number of performing activity per year

每年執行活動數目

教師活動調查 2012

Survey of Educators' activities 2012

Project WET Japan

The factors that educators did not do any activities

教師沒有執行活動的原因

5

Next
Target
下一個
目標

Mid-term Strategy 中期策略

Professional Teacher 專業老師

School Teachers are dealing with many children every day
學校老師每天都接觸很多小孩接觸

Large market for Project WET
Project WET的龐大市場

Project WET Japan

Strong Point and Weak Point 強項及弱點

強項 Strong Point

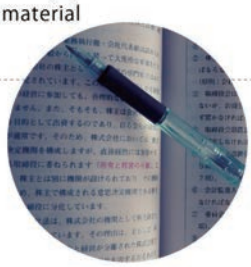
有很多戶內活動，適合在課室內推行

- Project WET has many indoor activities which can be used in class room
- Project WET activities are suitable for many subjects and units

適用於很多學科及單元

弱點 Weak Point

- School Teaching is based on Official Education Ministry guidelines
  → There are many difficulties to use non-official material
- Most of teachers are very busy



- 學校教學是基於國家教育部指引
→ 使用非官方教材會遇到很多困難
- 很多老師都十分忙碌

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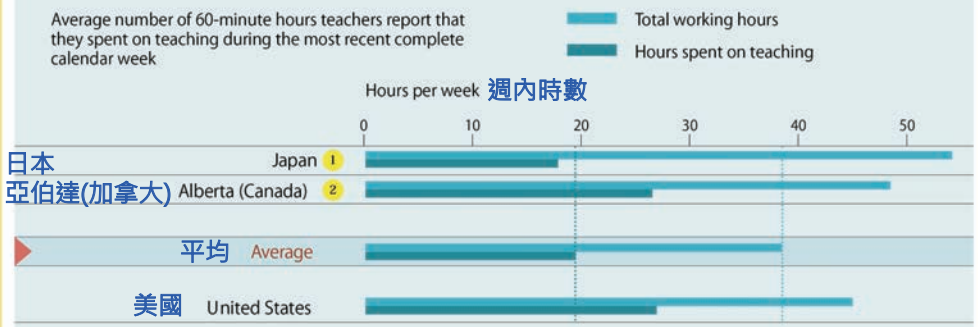
老師工作及教學平均時數

Average hours spent working and teaching per week

Average number of 60-minute hours teachers report that they spent on teaching during the most recent complete calendar week



Countries are ranked in descending order of hours spent on teaching.
Source: OECD, TALIS 2013 Database.

調適活動以融入學校課程

Project WET Japan

Adaptation into School Curriculum

Science	Social studies	Music	Language	Mathe matics	Art	Physical and Health
科學	社會科學	音樂	語言	數學	藝術	體育與健康

"Committee for Adaptation into School Curriculum" to adjust Activities and Guidebooks to Japanese school curriculum and system

設立委員會，調節活動及教學手冊，以切合日本學校課程

Guidebook
2009-
Cross Reference and Planning Charts

Reference material
2009-
List of case studies on Project WET activities adapted to school curriculum in Japan

Project WET Japan

學術教職員的折扣

Academic Discount & Faculty and staff discount

Guidebook

$50 ▶ $40

Discount

9所大學及4所工業學校在日本推行Project WET

9 Universities and 4 Technical schools in Japan introduced Project WET

(They described officially it in their syllabus)

已將Project WET正式列入課程大綱

$30 More Discount

Project WET Japan

將大學生視為中長期目標
Aiming at University students in the near-to-mid term

Project WET Japan

首要任務
Foremost Task

增強Project WET在專業老師圈子內的知名度
Increase name recognition
among professional teachers

We have to..

增加推行Project WET活動的大學院校數目
Increase the number of universities
which introduced Project WET

提升Project WET活動及教材的應用性
Inprove the usability of
activities and materials for Teachers

增加Project WET認可教師數目
Increase the number of teachers
who are certified as Project WET leader

增加參與Project WET活動學生數目
Increase the number of children who
have experienced with Project WET

Project WET Japan

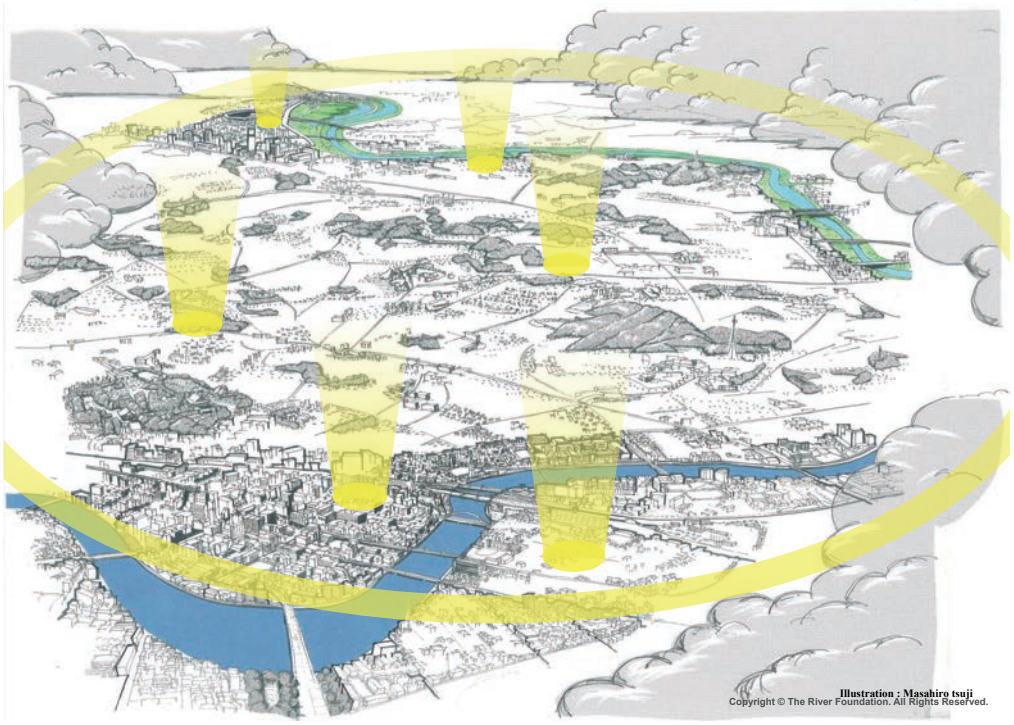


Illustration : Masahiro tsuji

Project WET Japan

More Info

www.project-wet.jp

WET JAPAN Search

project-wet@kasen.or.jp

謝謝！

Thank you for your attention!

River Foundation Japan

社區投入海洋環境行動方案 - 澳洲案例

Engaging the community in marine environmental action programs, an Australian example.

一、講者：David Kopelke PSM

David Kopelke 博士是柏伊恩島環境教育中心（Boyne Island Environmental Education Centre, Australia ）校長，該中心隸屬於澳洲昆士蘭省政府的教育部門。擁有豐富環境教育經驗的 Dr. David Kopelke 校長也以他豐富的教育經驗作為主題，發表有關環境教育扮演的功能角色文章；其他也出版了達爾文港海洋生物多樣性的相關處版品。並且在第三屆的世界環境教育會議 (World Environmental Congress) 和美國國家解說學會發表文章。也因為 David 博士在環境教育上面的貢獻，他曾獲得女皇頒發的公共服務勳章（Public Service Medal, PSM），以表揚他在環境教育上的貢獻。

二、摘要：

Community concern about water quality in Gladstone Harbour arose as a result of the presence of diseased fish and the death of a fisherman. One approach to address this concern was to involve the community in monitoring the quality of water. This presentation describes one Australian example of how schools and the community can be engaged in on-ground environmental action to care for our environment.

社區因為生病的魚類以及漁夫的死亡，而增進了對於格拉史東海港水質的關心。一個能夠滿足他們關心的方式，即是讓他們參與進行水質的監測。本簡報的內容在呈現澳洲的案例，說明學校與社區如何被引入從事與關心他們在地環境的環境行動

社區投入海洋環境行動方案：澳洲案例

Engaging the community in marine environmental action programs, an Australian example

柏伊恩島環境教育中心

Dr. David Kopelke, Ms. Ebonny Gabriel

Boyne Island Environmental Education Centre

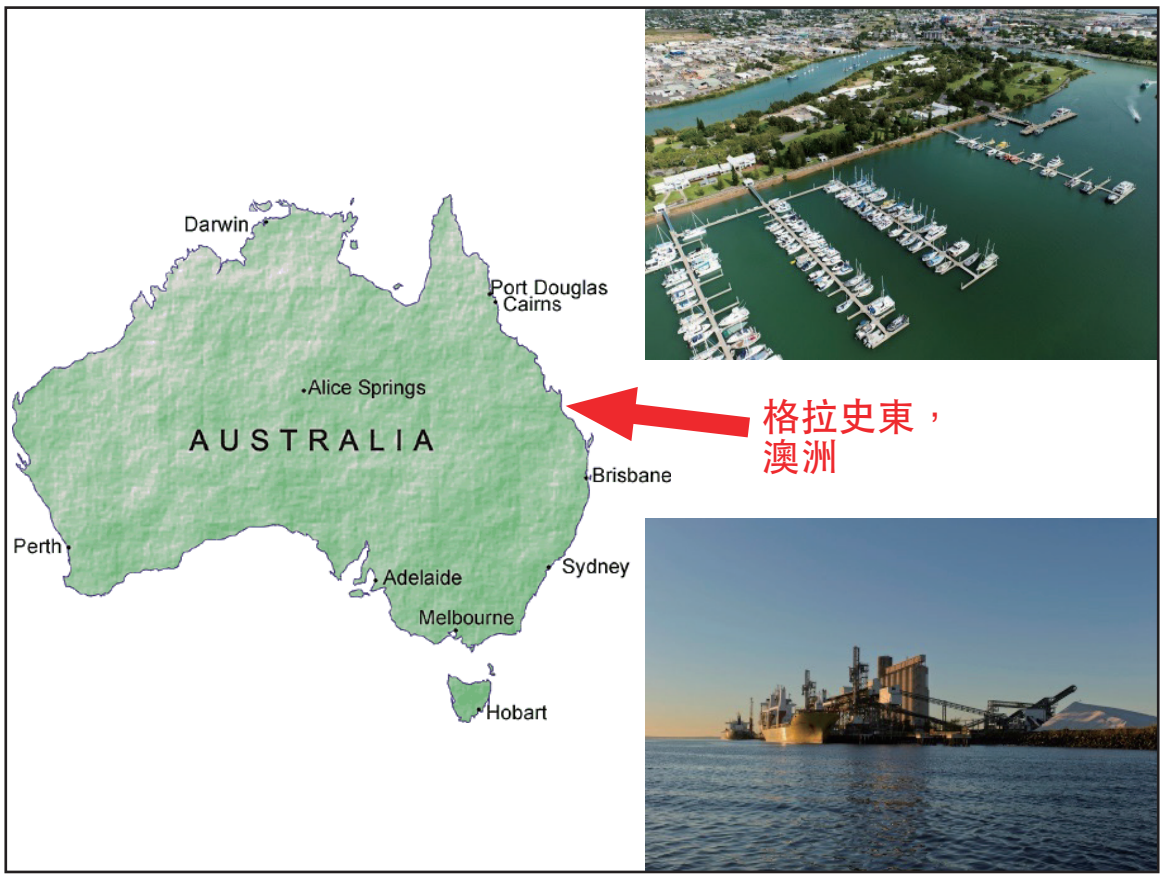
中譯為汪竹筠與王喜青

A

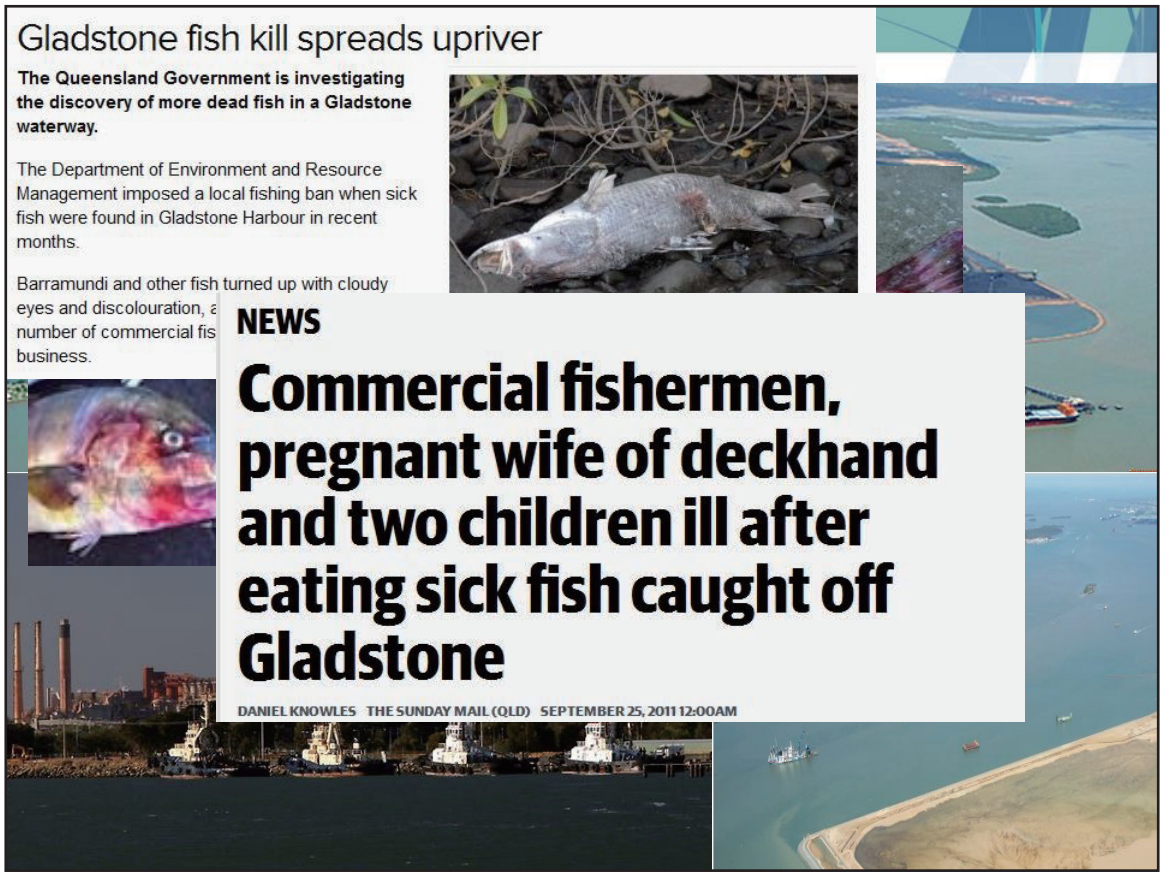
Latitude 24
北緯24度

Latitude 24
南緯24度

Presentation


Darwin
Port Douglas
Cairns
Alice Springs
AUSTRALIA
Brisbane
Perth
Adelaide
Sydney
Melbourne
Hobart
格拉史東，
澳洲


格拉史東，澳洲


Gladstone fish kill spreads upriver
The Queensland Government is investigating the discovery of more dead fish in a Gladstone waterway.
The Department of Environment and Resource Management imposed a local fishing ban when sick fish were found in Gladstone Harbour in recent months.
Barramundi and other fish turned up with cloudy eyes and discolouration, a
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NEWS
Commercial fishermen, pregnant wife of deckhand and two children ill after eating sick fish caught off Gladstone
DANIEL KNOWLES THE SUNDAY MAIL (QLD) SEPTEMBER 25, 2011 12:00AM


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生病的魚類以及死亡的漁夫，提升了社區對於水質的
Diseased fish and the death of a fisherman raise community concerns about water quality

Community idea & BIEEC lead agency

- 社區成員發展出監測港區環境現況的概念
- Community members develop the idea of monitoring environmental conditions in the harbour

- 柏伊恩島環境教育中心扮演著一個領導計畫發展的角色
- Boyne Island Environmental Education Centre acts as lead agency in developing proposal

How to finance a program?

資金來自於某些公眾認為會使水質變差的工業單位

Approach for sponsorship made to one of the industries linked by popular belief with the decline in water quality

AUSTRALIA PACIFIC LNG

GPC
Gladstone Ports Corporation
Growth. Prosperity. Community.

資金資助使計畫可以：

Grant makes possible:

- 聘顧計畫的兼職人員
- employment of part-time project officer

- 添購品質優良的環境監測器具
- purchase of high quality environmental monitoring equipment

- 計畫由BIEEC所掌管
- Administered through BIEEC

- 計畫支持的兼職人員由BIEEC雇用
- Project officer employed at BIEEC

計畫立基於過去的一些方案，如：
This program draws on protocols of past programs

計畫立基於過去的一些方案，如：
- 監測活動，其參數與資料蒐集是依據：
  - 看守水域昆士蘭河口監測手冊
  - 社區本位之水道監測健康與安全指引

- Monitoring activities, parameters and protocols based on:
  - Waterwatch Queensland Estuarine Monitoring Manual
  - Health & Safety Guidelines for Community-based Waterway Monitoring

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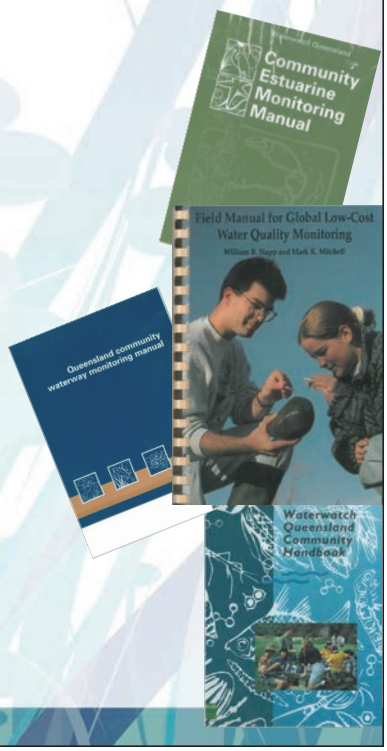

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Waterwatch Program

- 看守水域 (WaterWatch)
  - 全國有50,000參與本方案
  - 超過2000組進行監測工作
  - 監測了5400個地點246個流域 (Buxton, 1999)

- WaterWatch
  - 50,000 people were involved in the program nationwide, with
  - over 2,000 groups monitoring
  - 5,400 sites across 246 catchments **(Buxton, 1999)**

National Waterwatch network

Waterwatch Australia was an umbrella program overarching the State programs

- Australian Capital Territory : www.act.waterwatch.org.au
- Queensland : www.qld.waterwatch.org.au
- Victoria : www.vic.waterwatch.org.au
- South Australia : www.sa.waterwatch.org.au
- Western Australia : www.ribbonsofblue.wa.gov.au
- Northern Territory : www.greeningaustralia.org.au
- Tasmania : www.healthywaterways.org.au

Waterwatch Australia was decommissioned on 31 May 2013

Waterwatcher programs

The Water Bug Survey

- Every Autumn and Spring over 20,000 people search for insects, crustaceans, molluscs, and worms in local waterways

Murder Under the Microscope

- Technological eco-game played annually by hundreds of schools across Australia and even overseas to crack the environmental mystery

*https://**murderunderthemicroscope**.wikispaces.com*

Junior Waterwatch

- Designed for students in years 5 to 8

與學校一起著手

Commence with schools

學校方案聯結了澳洲國家課程

School program aligned with Australian National Curriculum

- 海洋科學
  - Marine Science
- 生物學
  - Biology
- 化學
  - Chemistry

QCAA Queensland Curriculum & Assessment Authority

AC Australian CURRICULUM

化學監測的參數

Chemical parameters monitored

水體

Water column

- pH 酸鹼度
- Turbidity 濁度
- Conductivity 導電度
- Temperature 溫度
- Dissolved Oxygen 溶氧

底泥

Substrate

- Mercury 汞
- Arsenic 砷
- Cadmium 鎘
- Copper 錳
- Manganese 硫化物
- **Sulphides**

生物監測的參數
Biological parameters monitored

水體 Water column
- 浮游生物 Plankton

底泥 Substrate
- 水底的微生物 Benthic Macro-organisms

Partners

Gladstone Healthy Harbour Partnership

Creekwatch

- 與其他社區方案形成夥伴發展流域監測方法
- Partner with other community programs to develop a catchment approach

- 與在地的原住民族形成夥伴
- Partner with indigenous groups

- 特殊地點或頻度由中昆士蘭大學（CQU）提供諮詢
- Particular sites and frequency decided in consultation with the Central Queensland University.

CQUniversity AUSTRALIA

Activities & methods differ

社區族群的監測活動與方法，因為監測方案複雜且多元的目的，而時常是不同於專業的科學家。

The monitoring activities and methods of community groups often differ from those of professional scientists, due to more complex and multiple aims of monitoring programs

原則上：

- 科學監測之目的是資料精確
- 社區小組之目的是教育以及促進志工參與

Principle aim of:

- Scientific monitoring - data accuracy,
- Community groups - to educate and inform the volunteers involved

(Cohn, 2008; Dasgupta & Wheeler, 1997; Delaney et al., 2007; Devictor, Whittaker & Beltrame, 2010; Nicholson, Ryan & Hodgkins, 2002)

Disparities from professional analysis

研究的呈現與專業的分析有相當大的不同

Research has shown that large disparities come also from professional analysis

S. Minchin，水資源管理，自然資源與環境部，未出版資料。

社區本位的監測方案提供的社會價值：

- 建構社區居民對環境品質與環境議題的覺察
- 對環境品質和環境議題有所瞭解以及產生擁有感

Community-based monitoring programs provide valuable social outcomes including:

- **building community awareness,**
- **understanding and ownership of environmental quality and issues**

Students & science

- 使學生接觸到當代的科學實務
- **Expose students to the practice of science in contemporary and socially engaged settings**

- 致力於讓科學與社會更加聯結
- **Makes science more relevant**


行動研究 ACTION RESEARCH
確認問題
（發生什麼事）
Identify Problem
(What's up?)
調查問題
（找出事實）
Investigate problem
(Just give me the facts)
評估資料
（有什麼意義？）
Evaluate data
(What does it all mean?)
列出可能的行動
（可能會發生什麼？）
List possible actions
(What could happen?)
預測結果
（做了會有什麼？）
Predict outcomes
(But if we do that - what then?)
選擇最佳行動
（就是它了！）
Select best action
(This is IT!)
執行行動
（起而行吧！）
Implement action
(Let's hit the road)
評估行動
（做得如何？）
Evaluate action
(How'd it go?)
確認新問題進入下一循環
Identify a new problem and follow procedure


PORT CURTIS
Harbour Watch
HARBOUR WATCH
Understanding our Harbour
"Port Curtis Harbour Watch is a school and community based science program, monitoring marine and estuarine water and substrate in the Gladstone Harbour. We aim to promote stewardship and responsibility for the future health of the harbour ."
Port Curtis Harbour Watch is sponsored by Australia Pacific LNG
AUSTRALIA PACIFIC LNG
and proudly supported by the Gladstone Combined Schools, Boyne Island Environmental Education Centre, Local Marine Advisory Committee, Central Queensland University, and Gladstone Ports Corporation
www.harbourwatch.eq.edu.au www.harbourwatch@boyneislеec.eq.edu.au
For further details phone: 0499 54 24 24


reef guardian school
OCEANWATCH AUSTRALIA
CORALWATC
AUSTRALIAN MARINE DEBRIS INITIATIVE
AUI WORLDWIDE SAFETY THROUGH EDUCATION
TANGAROA BLUE
OUTDOOR ENVIRONMENTAL EDUCATION CENTRE'S SUSTAINABLE RECREATIONAL FISHING PROGRAMME
Primary Industries and Fisheries Queensland Government
Education Queensland Queensland Government
Fish for the Future...
CapReef
BleachWatch
MangroveWatch Australia
HEALTHY WATERW


謝謝
Thank you
Dr. David Kopelke PSM
Ms. Ebonny Gabriel

台灣水資源夥伴網絡在地化經驗分享 -2

一、臺灣水資源夥伴網絡在地化經驗分享 -
以「武荖坑環境教育中心」為例

分享人：汪俊良

現為宜蘭縣武荖坑環境教育中心聯絡人，同時也是宜蘭縣國民教育輔導團環境教育議題的專任輔導員。在成立環境教育中心的初期，俊良老師是中心內唯一的專任輔導員，他除了負責中心運作與課程環境發展外，也積極的參與各項環境教育會議，連結了現有的學校教育與民間 NGO 團隊的資源。目前也積極的在宜蘭縣推廣溪流生態的環境教育，希望藉由觀察與實際體驗來激發參與活動的學員對自然的認同感並引起他們對環境保護的共鳴。

臺灣水資源夥伴網絡
在地化經驗分享
-以「武荖坑環境教育中心」為例

汪俊良
宜蘭縣國民教育輔導團 環境教育議題輔導員
武荖坑環境教育中心 聯絡人

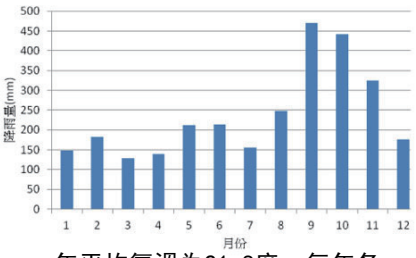
2014. 11. 12

為什麼 武荖坑 要推動『水環境教育』？

水水蘭陽-宜蘭。水的故鄉

水的故鄉(一)

宜蘭縣月平均降雨量分布
(統計期距1981~2010年)

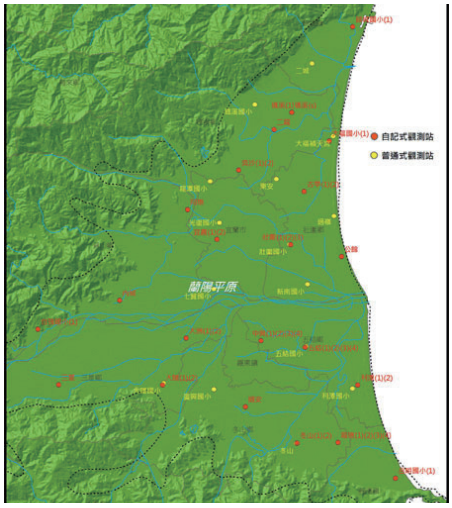


年平均氣溫為21.8度，每年冬天為雨季，年降雨日約174天，年平均降雨量約3,000毫米（台灣平均年雨量約2,500毫米）

宜蘭縣河川水系分布圖

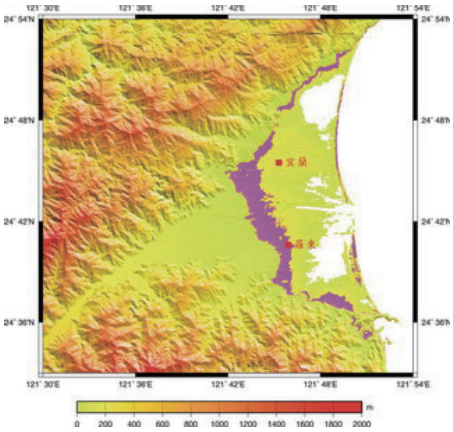
水的故鄉(二)

- 水源
  - 無湖庫設施蓄存調配地面水源水量。
  - 各標的用水量以地面水為多，佔89%，公共用水部分，63%自來水來自地下水。
- 地下水
  - 縣內建置有45口地下水觀測井 。
  - 地下水位每年之9~1月為高水位期，3~ 7月為低水位期 。
  - 蘭陽溪北岸之礁溪、大福站之枯水季地下水水位已低於0公尺以下，顯示礁溪一帶地下水已有超抽之情形。
  - 沖積扇的扇央區中興以及壯圍等站地下水為自噴井 。



地下水觀測井分布圖

水的故鄉(三)



蘭陽平原主要湧泉帶分布圖

- 湧泉
  - 出現在砂礫地層漸變成沙泥地層的附近，當地下水在滲透性大的砂礫中流動時，遇到阻水層，因上下游不同高度的靜水壓差，使地下水湧出地面，形成湧泉。
  - 蘭陽平原上標高約7-15公尺的位置最符合此種地質條件，圖中紫色區域就是目前大家熟悉的湧泉公園、湧泉游泳池、戲水池或湧泉洗衣水池，大都座落在這個範圍內。

First Impression