



# 做好CSZ地震準備

## 中文講座 / 說明會

April 6, 2019

Beaverton Police & Court Building

主講人：

張啟聖 Stephen Chang

黃明姿 Emily Cooper

主辦單位：大波特蘭台灣同鄉會

支持單位：

- 台灣鄉友會 • Mercy Corps • Red Cross
- City of Beaverton Emergency Management
- Multnomah County Emergency Management
- Lake Oswego Neighborhoods Preparing for Disasters

# 各種災難

- 地震
- 海嘯
- 洪水
- 龍捲風
- 颶風
- 土石流
- 恐怖主義活動
- 濫殺射手
- 政治動盪
- 氣候變化
- 野火與森林火災
- 放射性物質外洩
- 流感與傳染性疾病
- 網絡攻擊
- 水源污染
- 火山爆發





# Regional Pacific Northwest Earthquakes



1980: Eureka Earthquake  
(M7.3, 北加州)



1993: "Spring Break Quake"  
(M5.6, 俄勒岡州)



2001: Nisqually Earthquake  
(M6.8, 華盛頓州)

## Subduction Zone Earthquakes



1960: Valdivia Earthquake  
(M9.5, 智利)

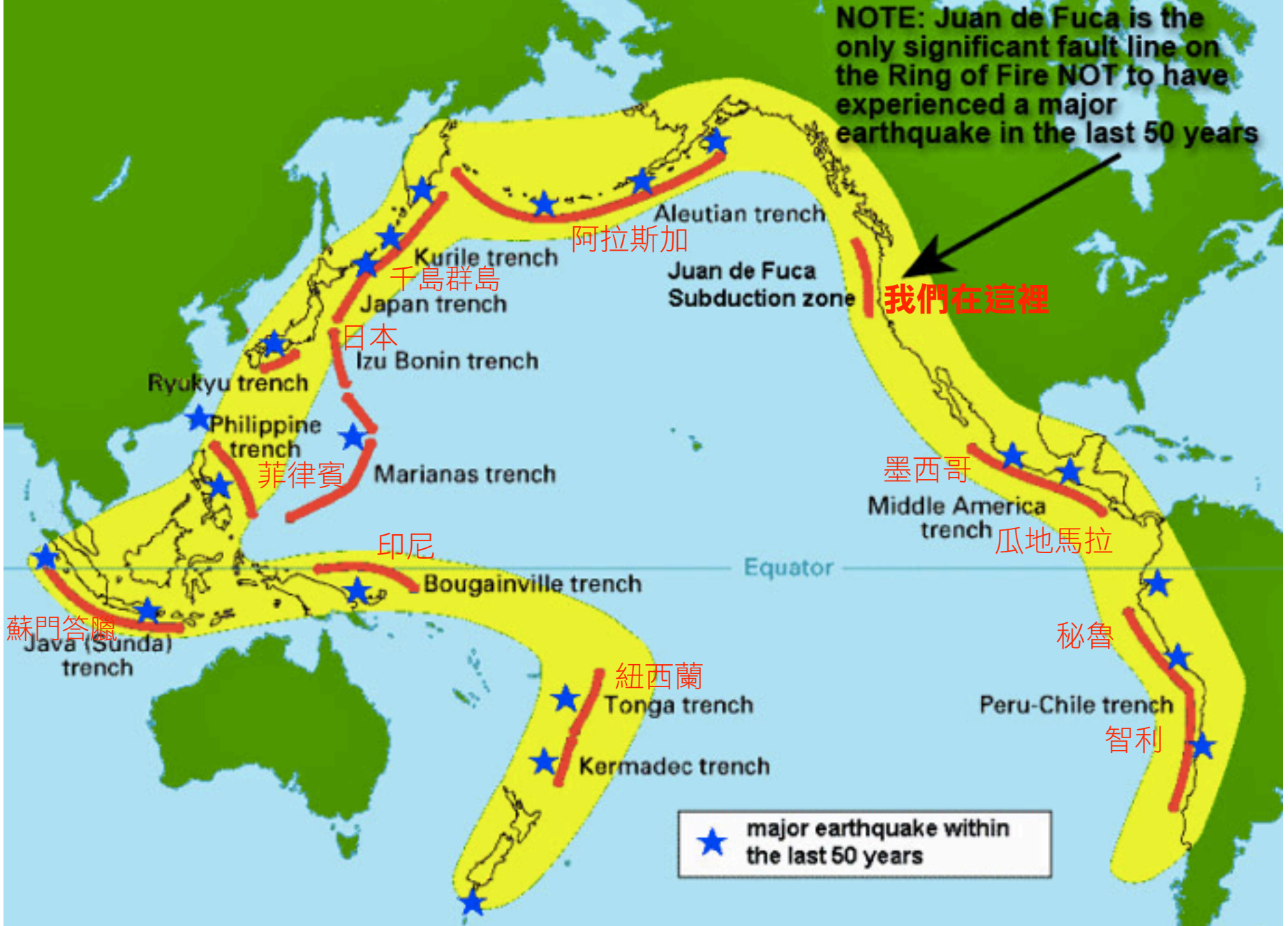


2011: 311 Tohoku Earthquake  
(M9.0, 日本)



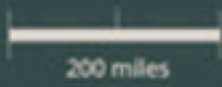
2017: Mexico Earthquakes  
(M8.1 & M7.1, 墨西哥)

NOTE: Juan de Fuca is the only significant fault line on the Ring of Fire NOT to have experienced a major earthquake in the last 50 years



# SUBDUCTION ZONES ON THE RING OF FIRE 火之圈地震帶





200 miles



The seaward edge of the subduction zone, where the subducting plates begin their descent beneath the North American Plate.



The stuck, or "locked" part of the interface between the North American and subducting plates - the fault that breaks in great earthquakes.

# Cascadia Subduction Zone

## PACIFIC OCEAN

Mendocino Fracture Zone

San Andreas Fault



加拿大

CANADA

Vancouver

Everett

Seattle

Tacoma

華盛頓州

WASHINGTON



Portland

我們在這裡

Salem

俄勒岡州

OREGON

Eugene

加州

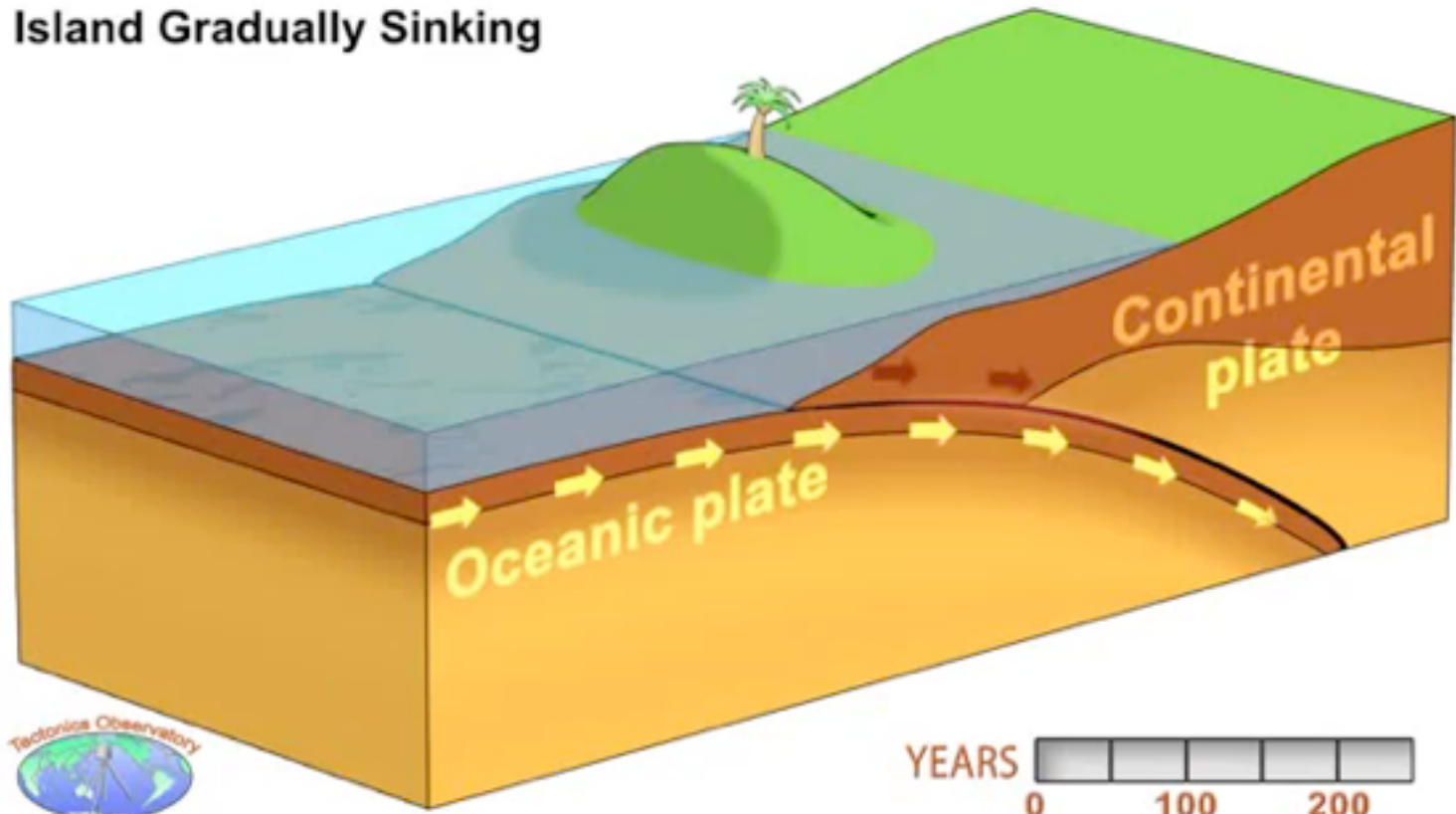
CALIFORNIA

Eureka

VANCOUVER ISLAND

# Subduction Zone Earthquake

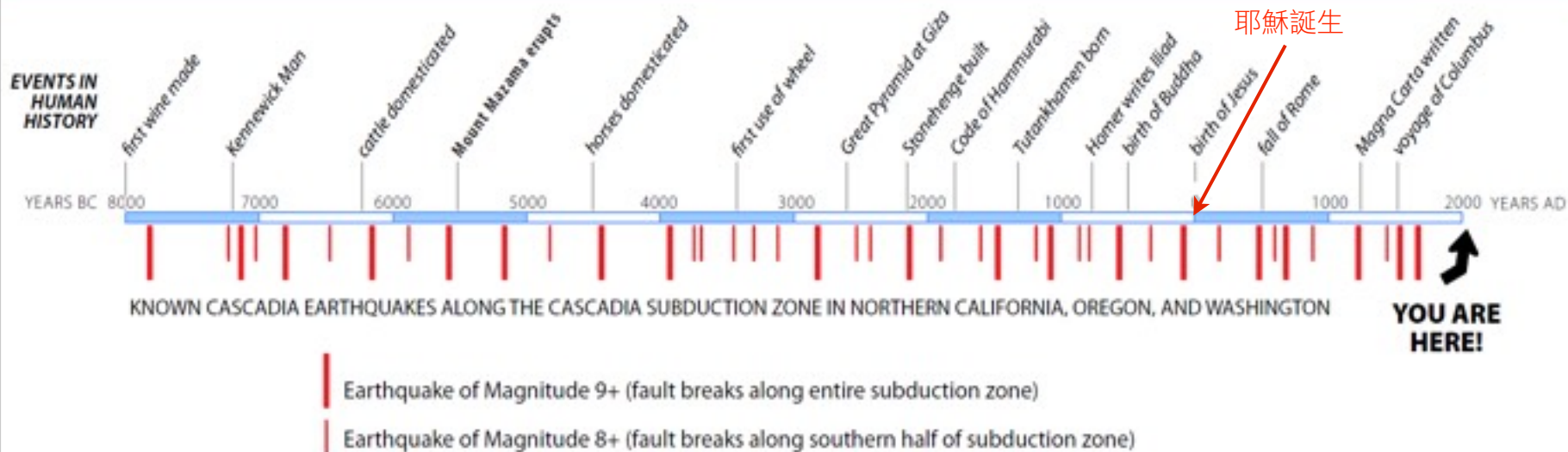
Island Gradually Sinking





科學研究證據顯示，CSZ地震平均每250至500年發生一次  
最近一次發生在西元1700年1月26日，那是319年前

### 過去1萬年CSZ地震發生過的時間點



Comparison of the history of subduction zone earthquakes along the Cascadia Subduction Zone in northern California, Oregon, and Washington, with events from human history. Ages of earthquakes are derived from study and dating of submarine landslides triggered by the earthquakes. Earthquake data provided by Chris Goldfinger, Oregon State University; time line by Ian P. Madin, DOGAMI.

# The Science & Narrative Evidence Behind Cascadia

Soil Samples showing **turbidites** from water and sand coming in 13 different times over the last 10,000 years (海底沙土樣本顯示不同年代的沉積物)

Land level changes

**Tree rings** that demonstrate trees that died along the coastline in 1700 (海邊死亡樹木的年輪)

Fire pits covered by tsunami sands in tidal marshes

The **orphan tsunami** that appeared in Japan (日本文獻記載1700/1/26的孤兒海嘯)

Native American stories of the Thunderbird and the Whale

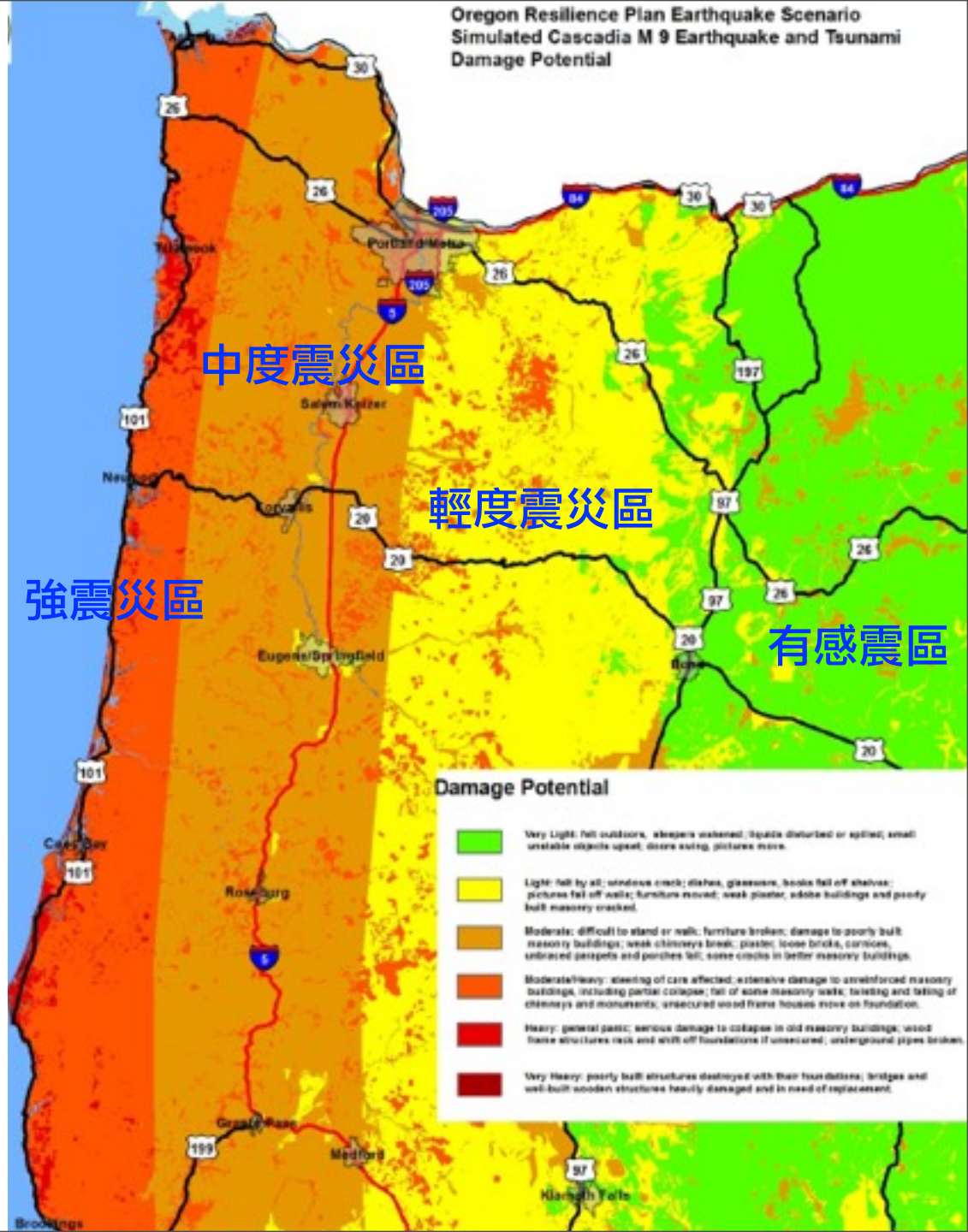




# Strong Ground Shaking

## 地表強烈震動

- Strong ground shaking (M9 w/ 2-9 min)
- Tsunami within 15 to 25 minutes



Look for the Signs...



在海邊.....





# In Portland...

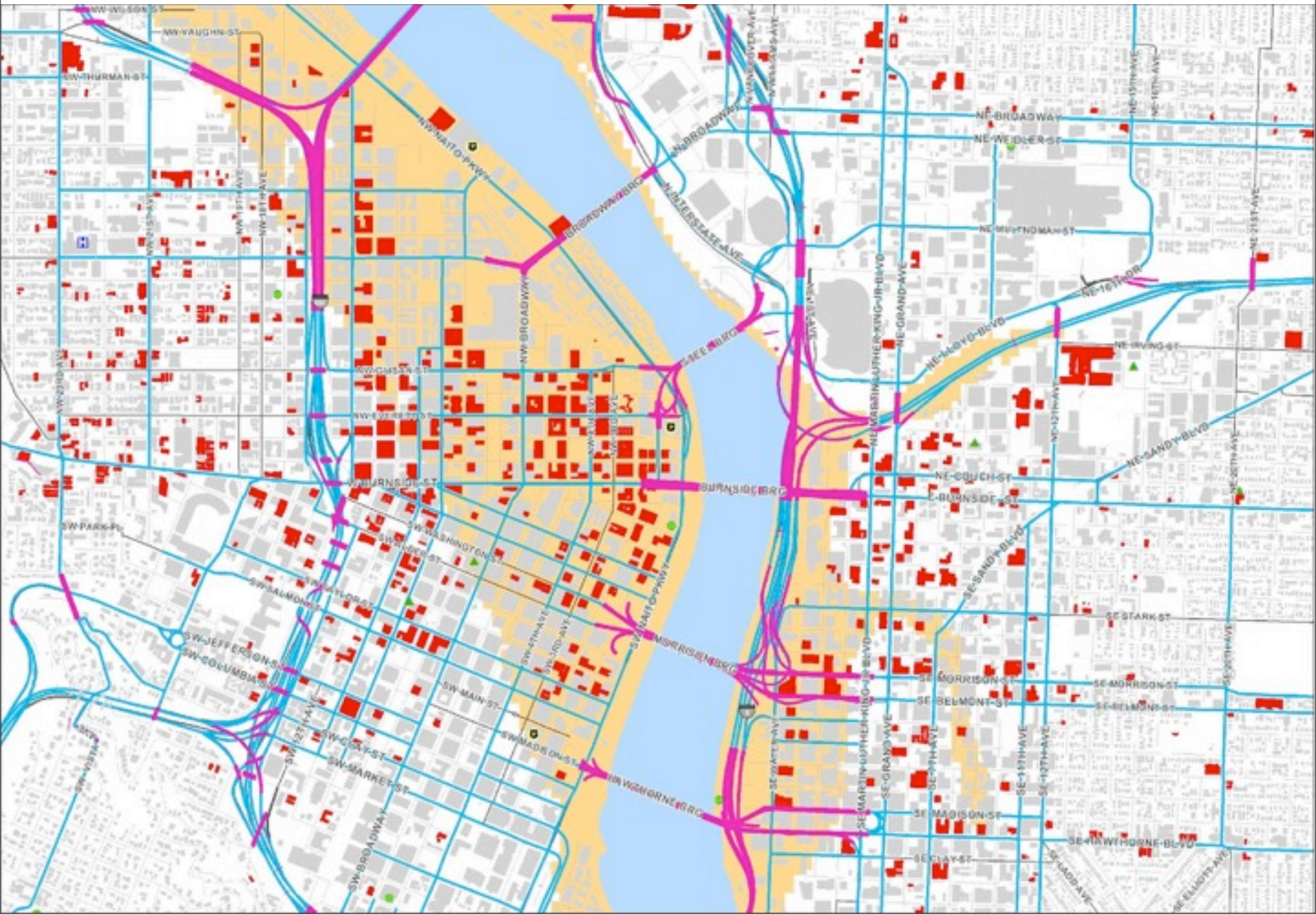
## 未經強化的磚建築

Buildings with Unreinforced Masonry



有壁爐的房屋 其磚造的煙囪可能會受損甚至倒塌

# Go to PBEM to Locate and Check Unreinforced Masonry Building Status





# Reinforced brick building 強化後的磚建築



Ecotrust building,  
downtown Portland



# In Portland...

老舊的橋樑.....

大多數都將**倒塌!**

Old bridges (before 1990)  
are not built to withstand an  
earthquake

Most will **Collapse**



The Steel, Burnside, Morrison and the Hawthorne Bridge

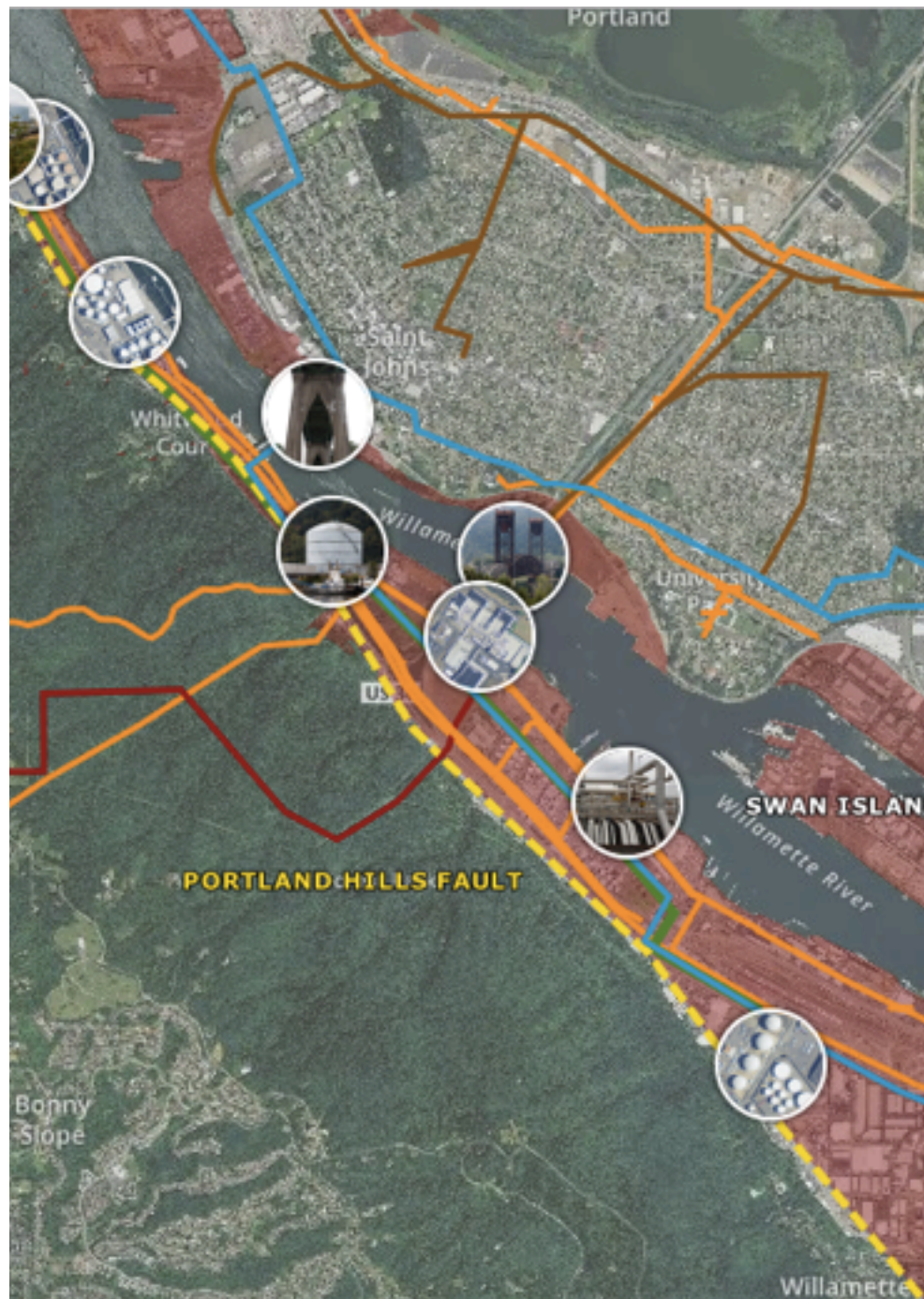
# Willamette River Bridges

Sauvie Island Bridge	2008
St Johns Bridge	1931
Fremont Bridge (I-405)	1968?
Broadway Bridge	1913
Steel Bridge	1912
Burnside Bridge	1910
Morrison Bridge	1958
Hawthorne Bridge	1910
Marquam Bridge (I-5) retrofitted	1964?
Tilikum Crossing Bridge	2015
Ross Island Bridge	1926
Sellwood Bridge	2016

Columbia River I-5 Bridge 1913  
Columbia River I-205 Bridge 1982?





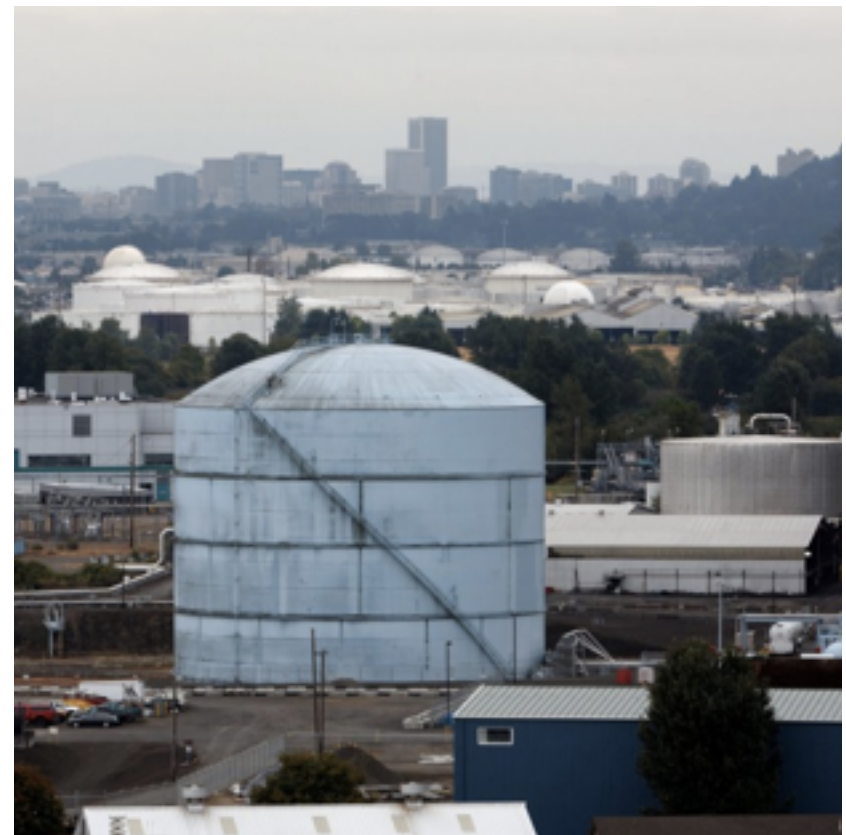


## In Portland...

能源樞紐區.....

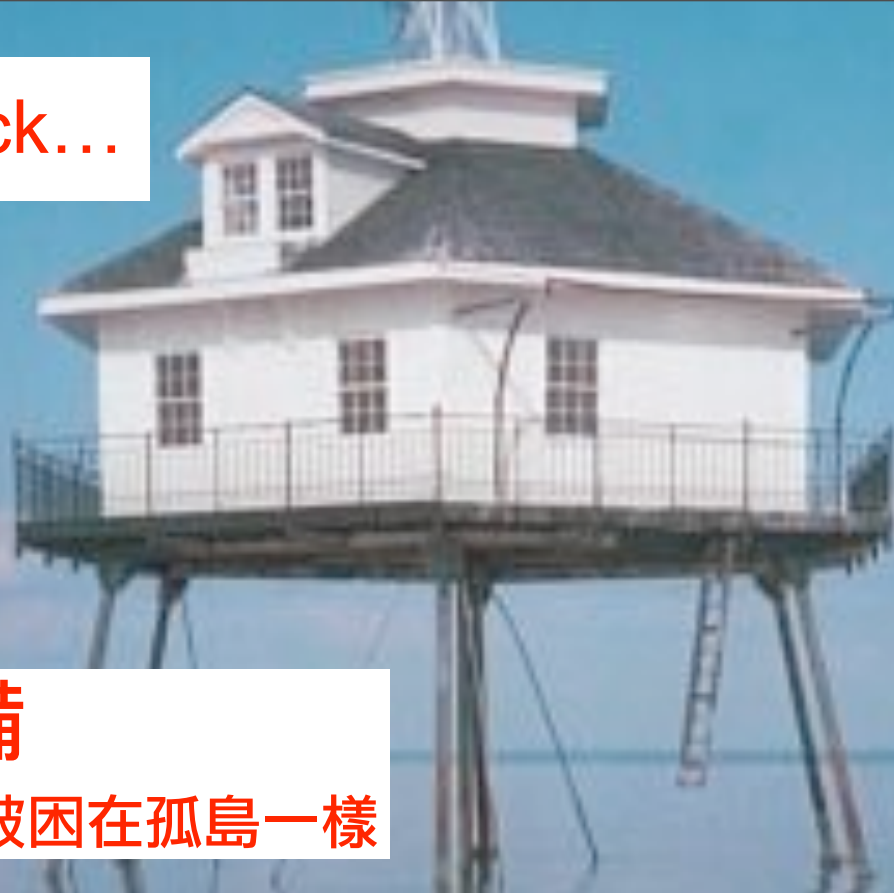
Portland's Energy Hub will be  
**Destroyed and Dangerous**

河灘新生地土壤液化 是主要的原因





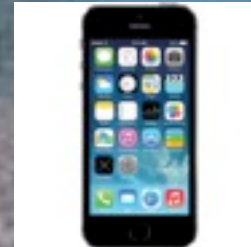
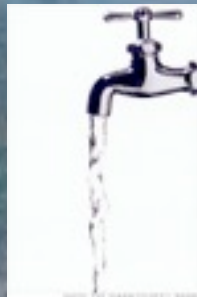
Plan to be stuck...



做好心理準備

整個災區會變成像被困在孤島一樣

...without your normal resources



# Oregon's Utilities Impacts

Critical Service	Zone	Estimated Time to Restore
Electricity	Valley	1 to 3 months
Electricity	Coast	3 to 6 months
Police and Fire Stations	Valley	2 to 4 months
Drinking Water and Sewer	Valley	1 month to 1 year
Drinking Water and Sewer	Coast	1 to 3 years
Top-priority highways (partial restoration)	Valley	6 to 12 months
Healthcare facilities	Valley	18 months
Healthcare facilities	Coast	3 years

## 地震災區受損的基礎設施與公共服務

最重要的設施與服務	估計恢復時間需要
電力	一到三個月
警察與消防	二到四個月
自來水與下水道	一個月至一年
主要的高速公路（部分修復）	六個月至一年
醫療服務設施	十八個月

**切記：災區民眾需要有自力更生14天的準備，若有能力30天較理想**



# 以下是日本311大地震 M9 四分鐘的視頻

我們一起來體驗一下

(台灣1999年的921大地震是M7.3)

心理建設篇

# What will Cascadia be like?

Japan Tohoku earthquake, 2011/3/11, 9.0 Magnitude



A woman with curly hair, wearing a grey hoodie and dark pants, is sitting cross-legged on a grassy field. She has her eyes closed and a peaceful expression, suggesting she is meditating. The background is a soft-focus landscape with a warm, golden light, likely from a setting or rising sun, creating a serene atmosphere.

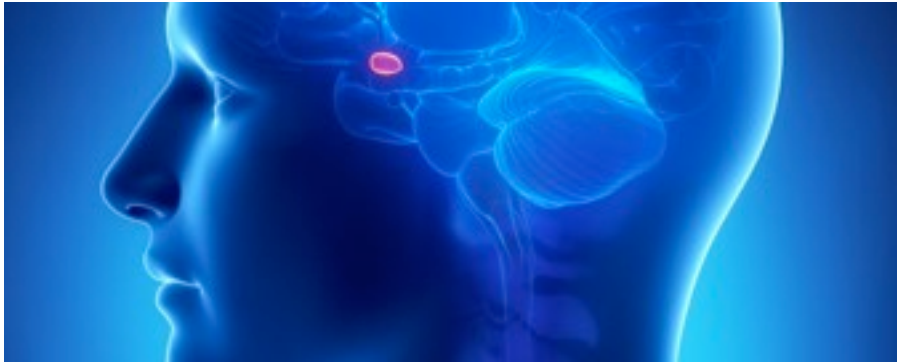
## Psychological Impact of Experiencing a Disaster

經歷災難後的心理影響會是巨大的

Breathe in...hold 3 seconds...  
breathe out...repeat



In an emergency, **rational decision making** is hindered  
在緊急災難情況下，**理性抉擇**的能力會受到阻礙



Practice coping strategies **練習加強心理建設!!**

“Your ability to handle the emergency will depend on many factors, but all other things being equal, the outcome will depend on how well you can cope psychologically.”

“一個人處理緊急情況的能力將取決於諸多因素，但在所有其他條件相同的情況下，最終結果將取決於你如何**理性應對**。”



為地震做好準備：  
提前計劃

What Can You do At Home?

你可以在家中做些什麼？





# Make a plan and Practice 制定一個計劃 / 練習

\*Hand out family planning template



# 家庭會議

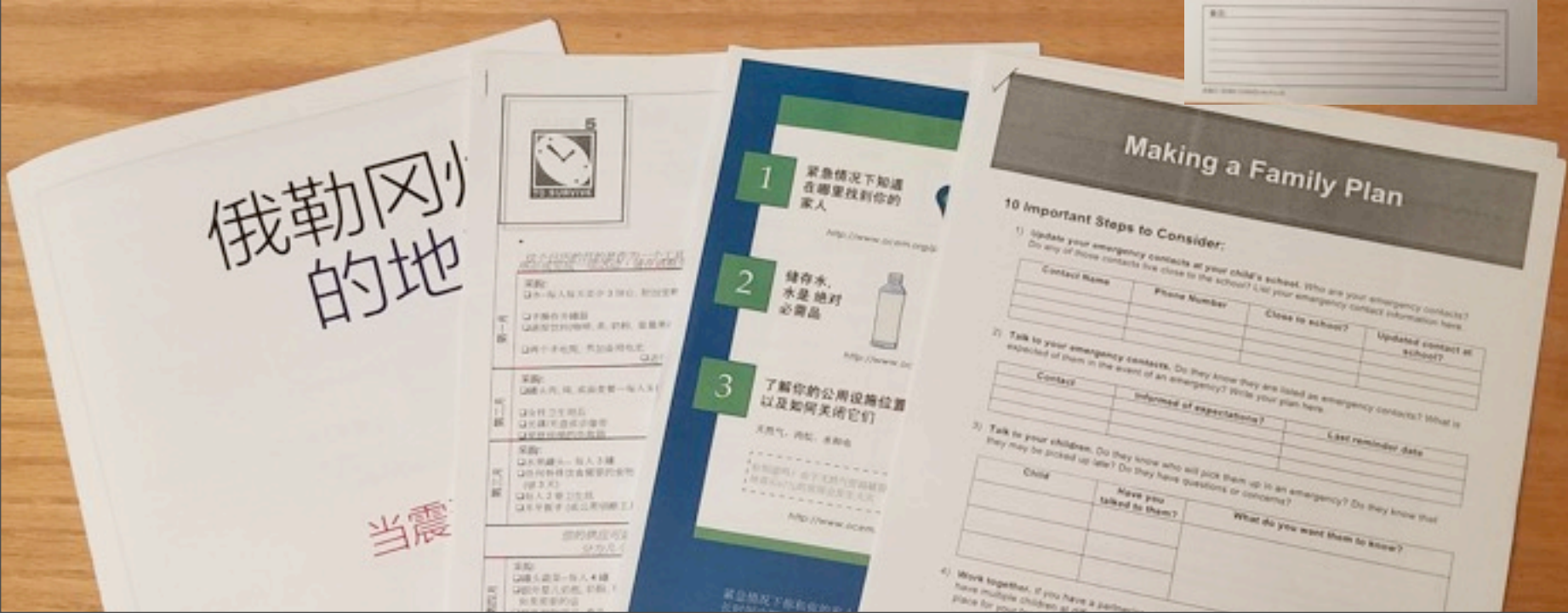
1. 應急計劃成員/您會想要聯繫誰？
2. 住在遠方的某人的電話？（無法相互聯絡到時）
3. 當發生地震時，你們會在哪裡見面？
4. 有什麼因素可能阻止您的應急計劃成員到這一地點見面？  
（提示：在托兒所中的孩子、在河的另一邊工作的家長）
5. 如果大家無法在這個地點見面，那麼該怎麼辦？
6. 特殊需求（有人有特殊的身體或精神 需求/ 藥物？）
7. 鄰居
8. 及時接收最新消息 請訪問 [publicalerts.org](http://publicalerts.org)

家庭成員位置圖

姓名 \_\_\_\_\_ 電話 \_\_\_\_\_

父母	祖父母	兄弟姐妹
子女	孫子女	其他親屬
...	...	...

備註:

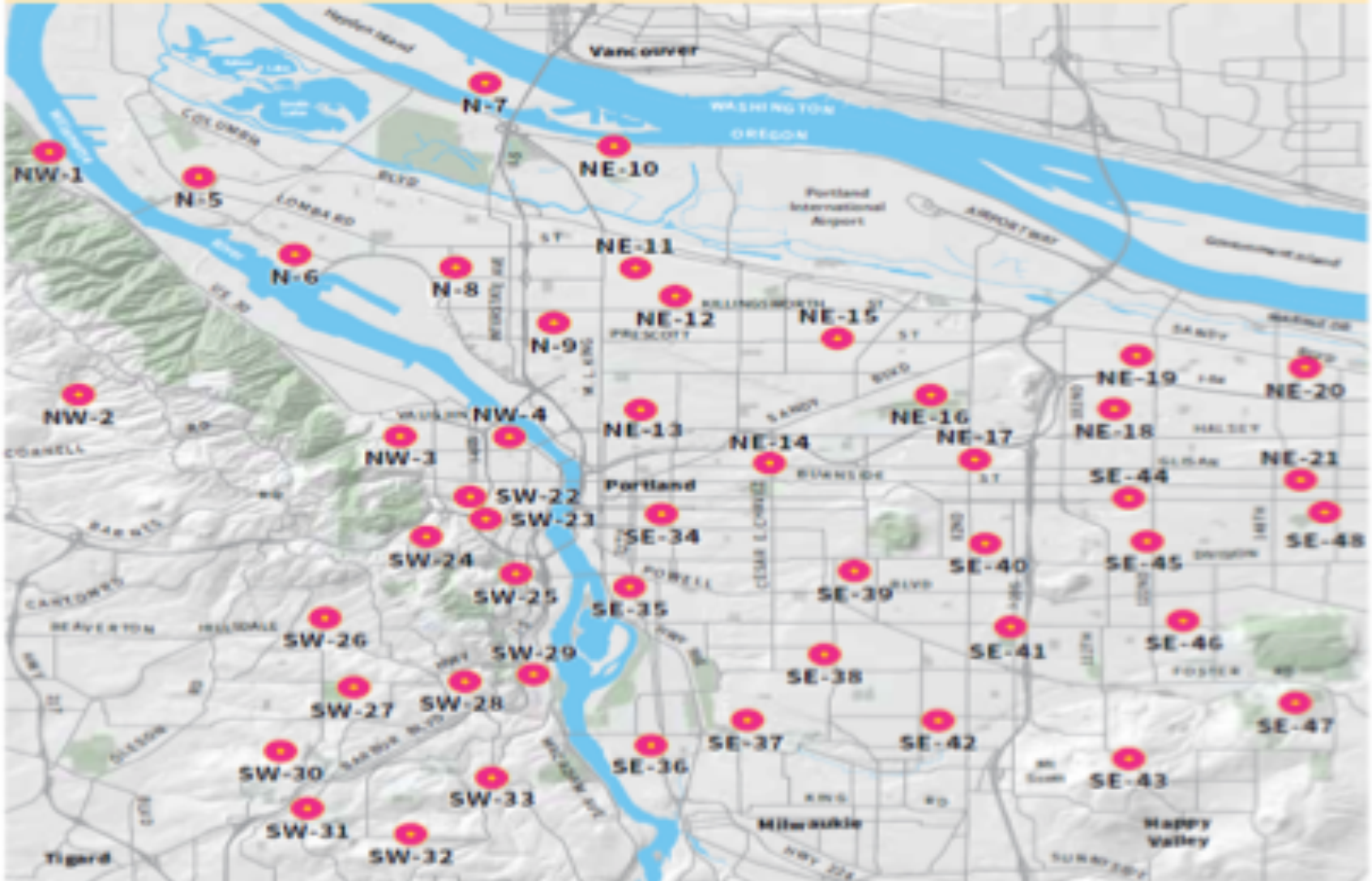




# If in Portland, know your BEECN site

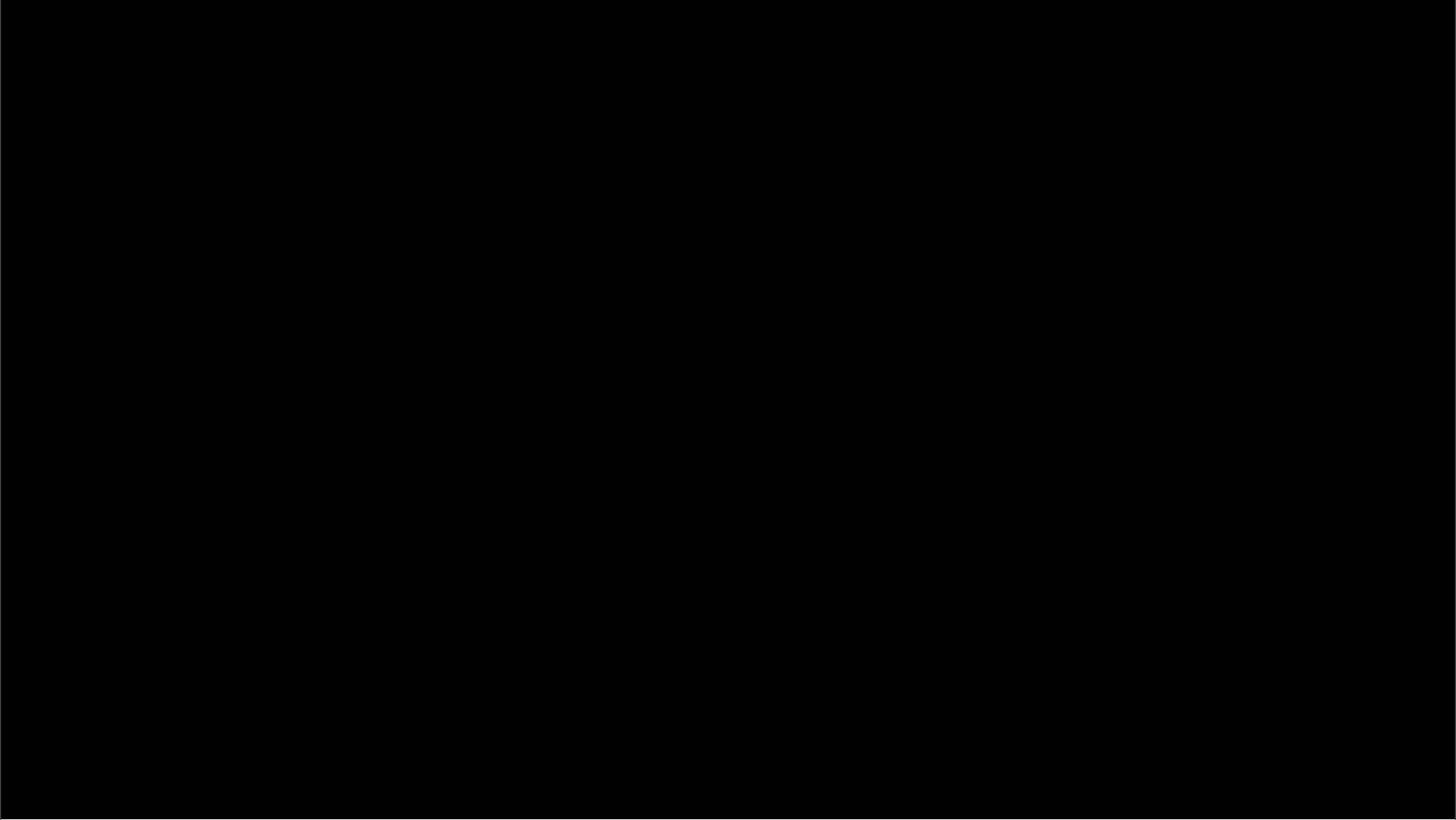
## Basic Earthquake Emergency Communication Nodes

Locate the earthquake "beacon" closest to where you live and/or work at [www.publicalerts.org/earthquake](http://www.publicalerts.org/earthquake)





# BEECN Intro Video



# Start an emergency food and Kit – Go Bag!



Basic Need



\*Remember that water will likely be your most critical item!





# Recommendation

Provide emergency drinkable water for at least **30 days**



2 people for 30 days: 60 gallons



4 people for 30 days: 120 gallons



6 people for 30 days: 180 gallons

# Recommendation

Provide emergency drinkable water for at least **30 days**

---



4 people for 30 days: 120 gallons

Store all 120 gallons



$$55 + 55 + 5 + 5 = 120$$

Alternative: Store half,  
acquire the rest



$$55 + 30 + \text{water filter} = 120+$$

# Secondary Recommendation

## ✓ Buy a Lifestraw Mission 12L



Total Cost: \$130

- Filters out bacteria and even viruses in water
- Proven to remove e-Coli and bacteria from the water in Lake Oswego
- 3 gallons per hour, 4700 gallon life  
-> shareable with neighbor



# Food Sources

Home first!

1. Refrigerator



2. Freezer



3. Pantry



# Food Sources

## 4. Deep Pantry



## 5. Long Term Food Storage



## 6. Farming and Gardening



## Food Safety



Spoiled foods....OR...

Rusty or damaged cans...OR....

Expiration/Good By Dates:



Credit: Lake Oswego Neighborhoods Preparing for Disasters

# Cooking Fuel

Food  
Preparation





## Go-Bag 應急包 (for 2 to 3 days use)

- 水及食物
- 醫療應急包
- 與外界溝通工具（收音機, 地圖, 充電器等）
- 重要文件（保險, 護照, 銀行信息, 現金等）
- 照明生火工具（手電, 蠟燭, 火柴, 打火器）



Credit: Lake Oswego Neighborhoods Preparing for Disasters

# Recommendation

## 準備建構應急品：

- 水與食物
- 生活用品
- 全個人需求 (藥物)
- 專家建議儲備足夠  
14-30天生活所需的物資



Start an emergency kit to go and decide where to put it

# Additional Information – Car Kit



Total Cost: \$20 per car



# 證件副本 / 電子本

\*As part of your emergency kit, prepare and duplicate your important documents

- Personal Documents
- Financial Documents
- Medical/Insurance Documents



## 緊急廁所與衛生處理

\*As part of your emergency kit...don't forget your disaster sanitation plan!



- Two five-gallon buckets
- A snap-on seat (recommended for comfort)
- Hand Sanitizer & Toilet Paper
- Carbon Material

# Download an App!

及時接收最新消息:

是否每個人都有註冊了接收 ---  
手機緊急電話提醒？

請訪問 [publicalerts.org](http://publicalerts.org)

災難發生後如果所有的網路信號都停擺：  
手搖發電NOAA災難資訊收音機或短波收音機

PublicAlerts

VISIT PUBLICALERTS.ORG

Receive emergency notifications via  
landline, mobile and email.

TV broadcasting



OREGON PUBLIC  
BROADCASTING

An advertisement for the Red Cross Emergency App. On the left, a smartphone displays the app's interface with alerts for 'Flood Warning' and 'Wind Advisory'. On the right, the text reads 'Red Cross Emergency App' and 'Help is in your hands. Get severe weather and emergency alerts, along with the steps on what to do next.' Below this is a 'Free download.' section with buttons for 'Available on the App Store' and 'Get it on Google play'.

**Red Cross  
Emergency App**

Help is in your hands.  
Get severe weather and  
emergency alerts, along with  
the steps on what to do next.

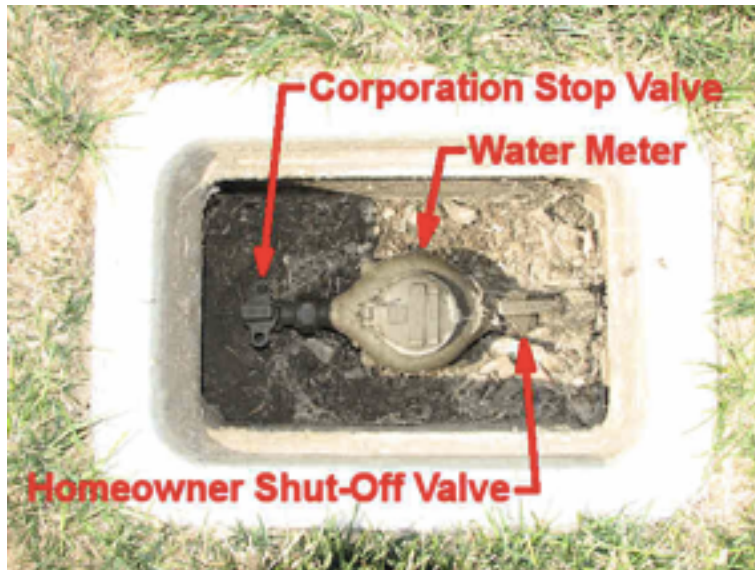
**Free download.**

Available on the  
App Store

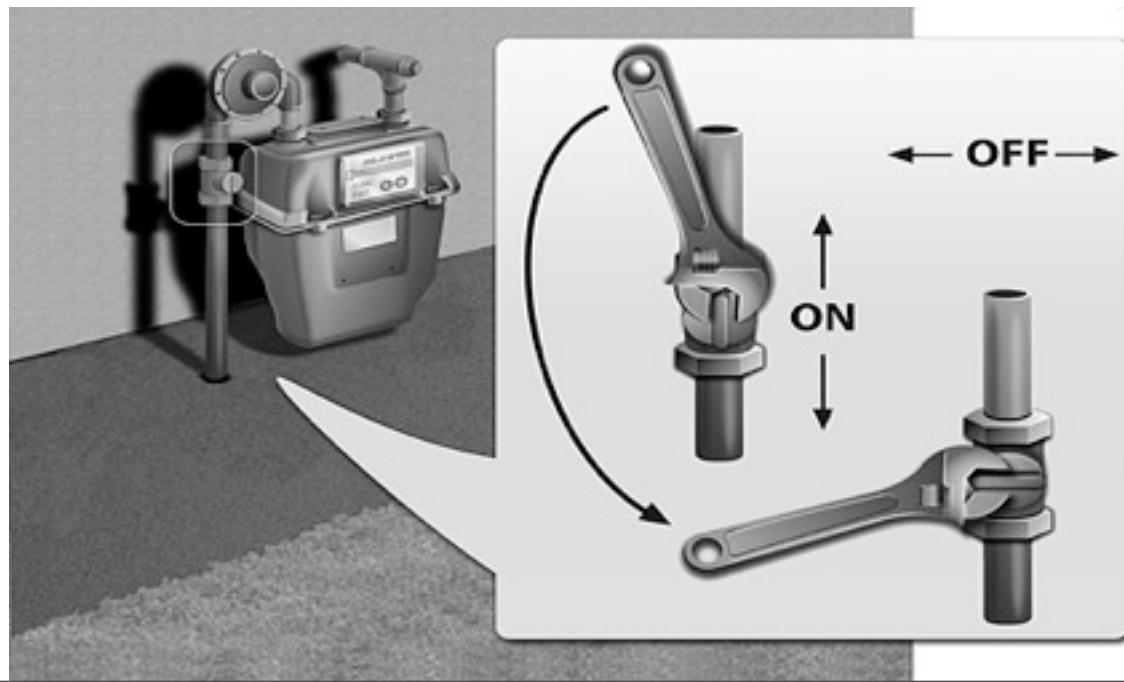
Get it on  
Google play



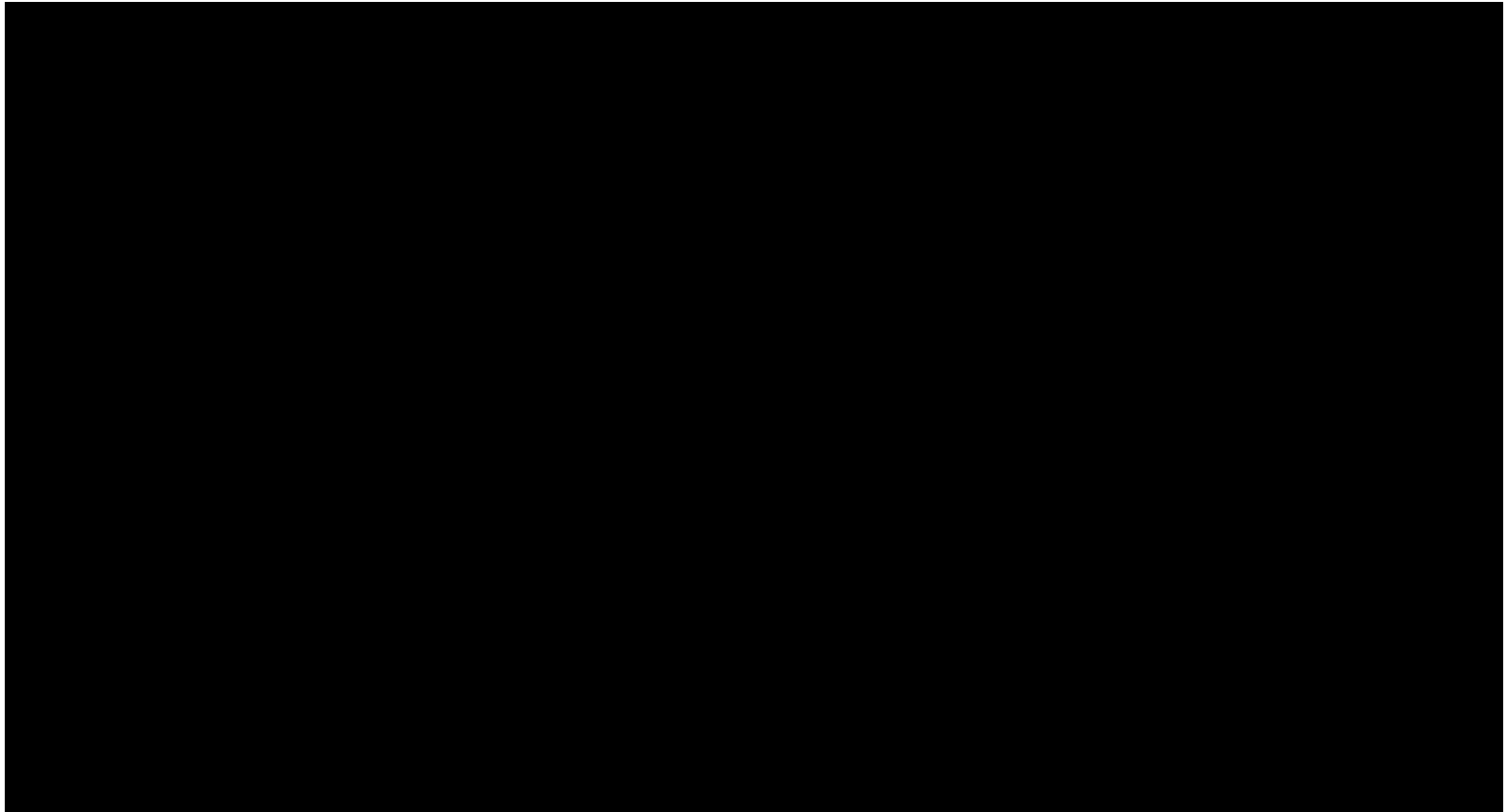
# Learn how to shut off your utilities



學習如何關掉  
水電瓦斯總開關



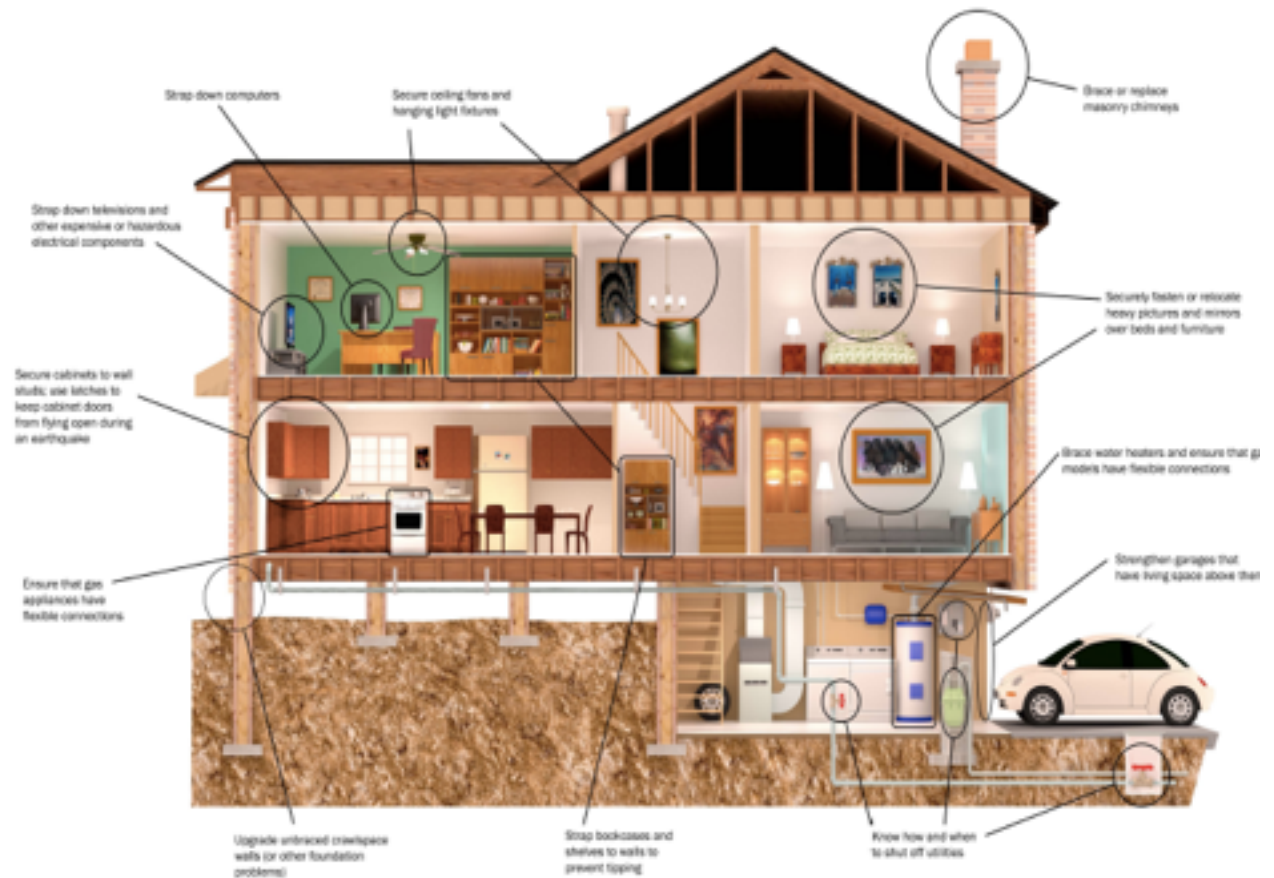
# Utilities shut off instruction video



# Minimize potential hazards in the home

This poster provides visuals and descriptions so that homeowners can identify and fix at-risk areas of their homes to reduce future earthquake damage and disruption.

**這張海報提供了視覺效果和描述，以便房主可以識別和修復他們家中的風險區域，以減少未來的地震破壞。**





# If possible... retrofit your home or building

## 如果可能, 考慮強化您的住宅!

- Do it yourself  
(courses at the Multnomah County Libraries or online resources)
- Get tips from folks who have done it
- Find a local company





What You Can Do In Your Community?

你可以在社區做些什麼？



Get to know your neighbors

去認識您的鄰居





# Protect Yourself During Earthquakes!

IF  
POSSIBLE



USING  
CANE



USING  
WALKER



USING  
WHEELCHAIR



Understand their needs

了解他們的需求



Consider becoming a NET/CERT member

考量參加緊急救援的義工團隊

About 30 hours of training, 12 volunteer hours a year





## 最後，請記住

抗災的韌性不是擁有一個經過強化的房屋，裡面放著用不完的電池。真正抗災的韌性是我們群體的互助關係，因為只要我們的互助關係存在，物質的損失是可以彌補的。

- Shannon Hayes, following Hurricane Irene

“True **Resilience** is not in having a fortified home that can stand in isolation with an abundance of toilet paper. True Resilience is in our relationships to each other. Because wherever those relationships exist, home will rebuild itself.”

- Shannon Hayes, following Hurricane Irene





以上是slideshow的部分  
謝謝大家!

接下來介紹一些幫助您  
具體展開地震準備行動的資料

Actionable Items List  
and  
Q&A