Resource Security in Morocco

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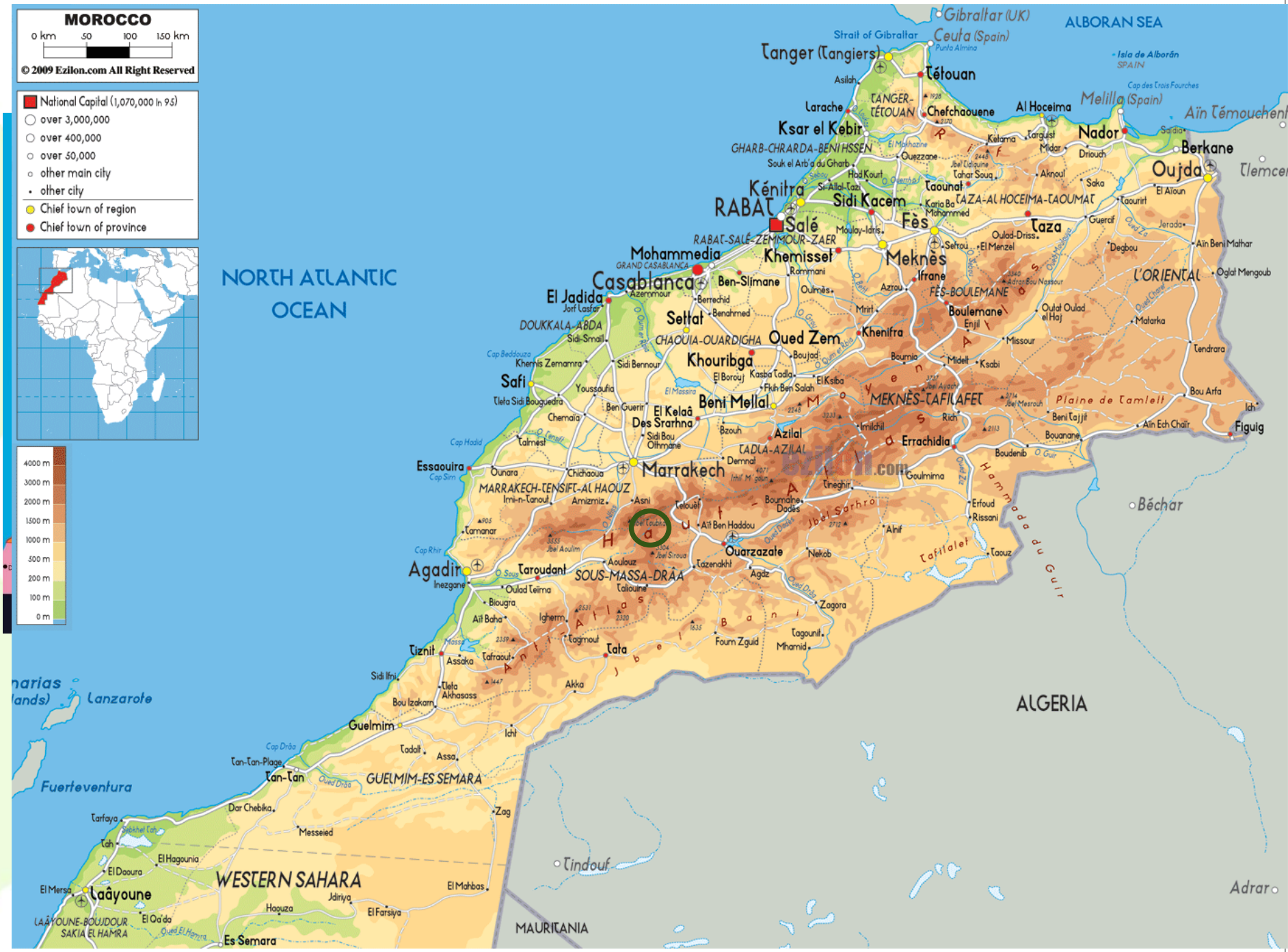
Leading the way in Agriculture and Rural Research, Education and Consulting

Lecture Outline

- Historic overview
- Water Security
- Energy Production
- Soil Security
- Food Security
- Minerals and Mining
- Sustainable Tourism
- Waste Management
- Environment and Sustainability Policy
- Progress and Innovation


MOROCCO
0 km 50 100 150 km
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National Capital (1,070,000 in 95)
over 3,000,000
over 400,000
over 50,000
other main city
other city
Chief town of region
Chief town of province
4000 m
3000 m
2000 m
1500 m
1000 m
500 m
200 m
100 m
0 m
NORTH ATLANTIC OCEAN
ALBORAN SEA
Gibraltar (UK)
Strait of Gibraltar
Ceuta (Spain)
Tanger (Tangiers)
Tétouan
Isla de Alborán
SPAIN
Melilla (Spain)
Cap des Trois Fourches
Aïn Témouchent
Tlemcen
Larache
Ksar el Kebir
TANGER-TÉTOUAN
Chefchaouene
Al Hoceima
Nador
Berkane
Oujda
GHARB-CHRARDA-BENI HSSEN
Kénitra
RABAT
Salé
Sidi Kacem
Fès
TAZA-AL HOCEIMA-TAOUMAT
Taza
RABAT-SALÉ-ZEMMOUR-ZAER
Mohammedia
GRAND CASABLANCA
Casablanca
Khemisset
Meknès
El Jadida
Ben-Slimane
Settat
DOUKKALA-ABDA
CHAOUIA-OUARDIGHA
Oued Zem
Khouribga
FÈS-BOULEMANE
L'ORIENTAL
Safi
Beni Mellal
El Kelaâ Des Srarhna
MEKNÈS-TAFILALET
Plaine de Tamlelt
Figuig
Essaouira
Marrakech
MARRAKECH-TENSIFT-AL HAOUZ
TADLA-AZILAL
Errachidia
Agadir
Taroudant
SOUS-MASSA-DRÂA
Ouarzazate
Tiznit
Tata
Guelmim
GUELMIM-ES SEMARA
Tan-Tan
Laâyoune
WESTERN SAHARA
LAÂYOUNE-BOUJDOUR-SAKIA EL HAMRA
Es Semara
Lanzarote
Fuerteventura
Béchar
Tindouf
Adrar
ALGERIA
MAURITANIA

Economic Status

World Bank Projections (2018-19)

- GDP Growth decline
- Increase in unemployment
- Rural Poverty

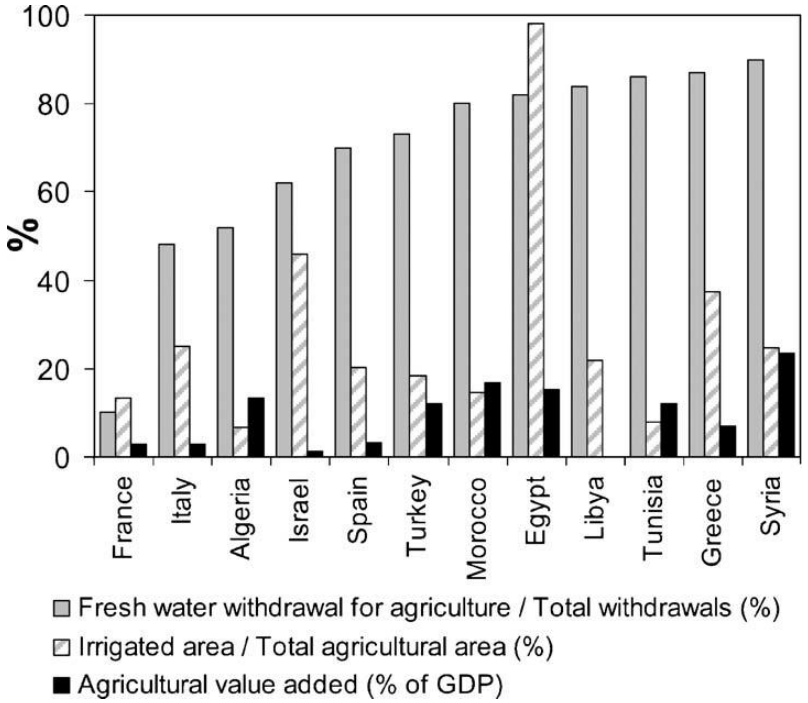
BUT

- Decline in poverty
- Reduction in food share and move toward food with higher nutritional value

https://www.worldbank.org/en/country/morocco/publication/poverty-in-morocco-challenges-and-opportunities

Water Security

- Water Scarcity
- Sedimentation
- Flooding
- Water Use

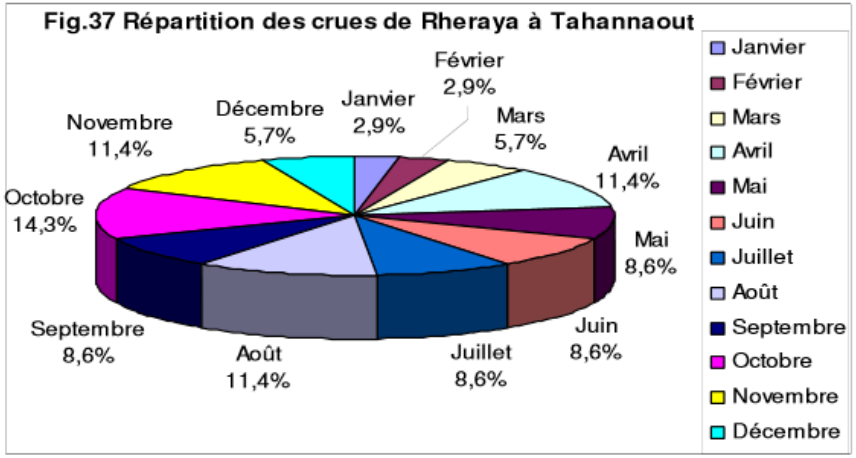


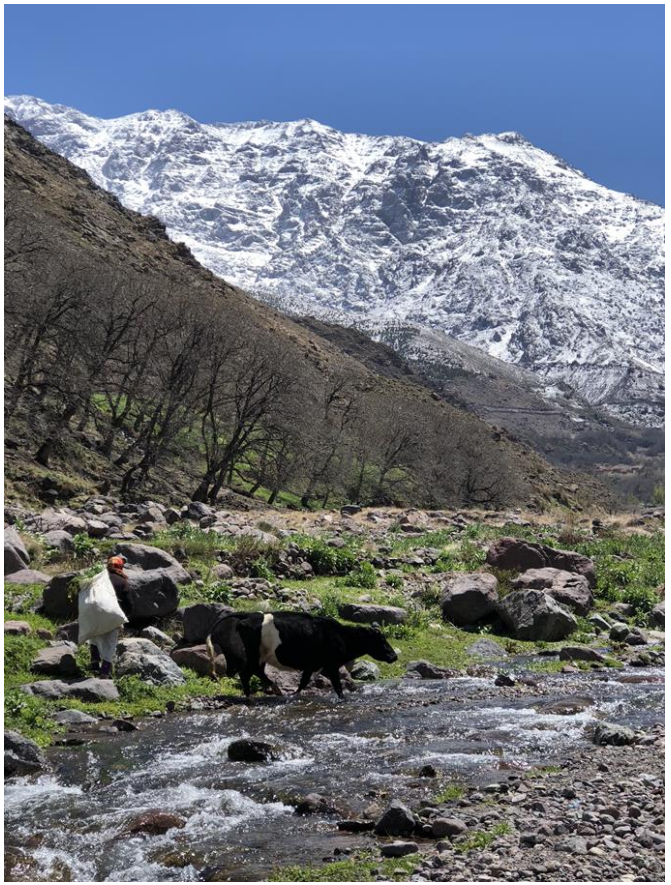
FAO 2005

https://youtu.be/OFLJJ9Jj23w

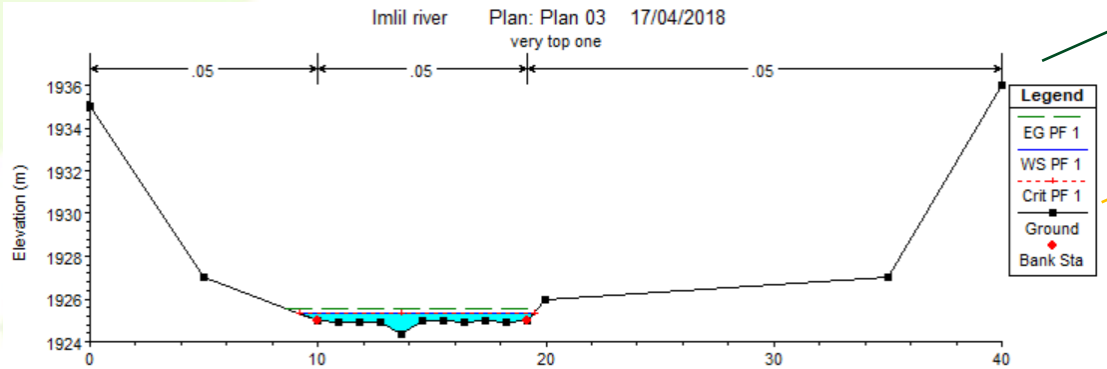
Water Quality and Flood Potential

- The Rerayha River is a crucial source of water which supports agricultural and human activities throughout the Imlil valley (Kennedy, 2009).
- The river originates at the Mount Toubkal, passes through the local valley and ends in central Morocco.
- Both natural and anthropogenic systems influence water quality.
- Chemical and biological analysis were undertaken.



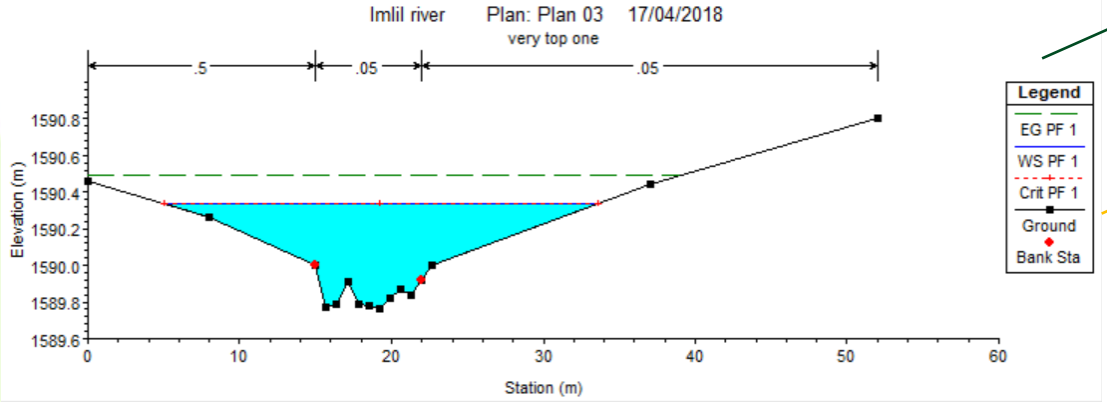


Model Outputs: normal flow at 8.95 m³/s



Site (2) taken on day one of sampling near the river source

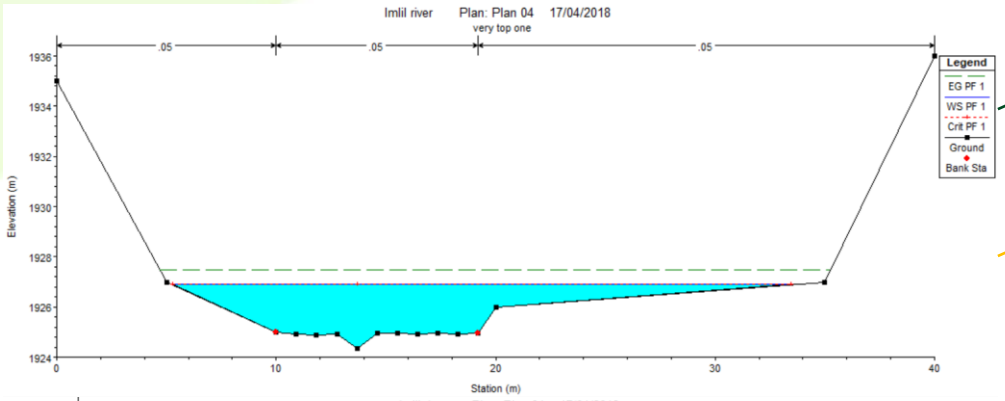
Stream power: 300.76 N/ms



Site (8) taken on day two of sampling further down the river

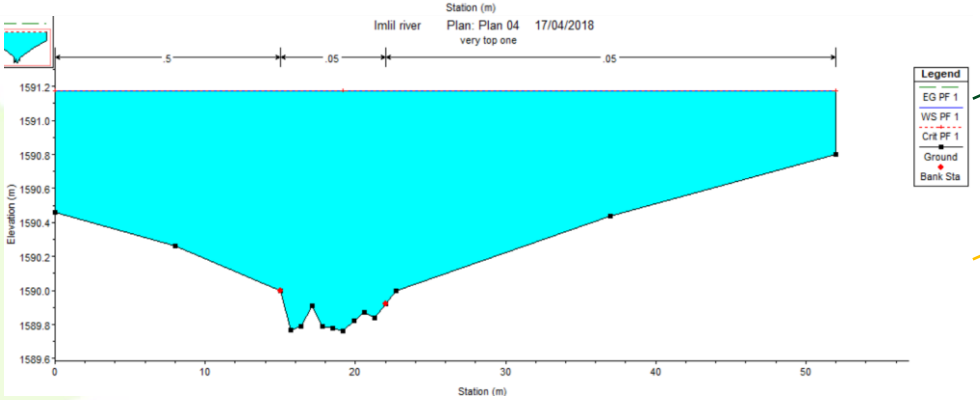
Stream power: 218.78 N/ms

Model Outputs: x10 normal flow at 89.5 m³/s



Site (2)

Stream power: 1008.61 N/ms

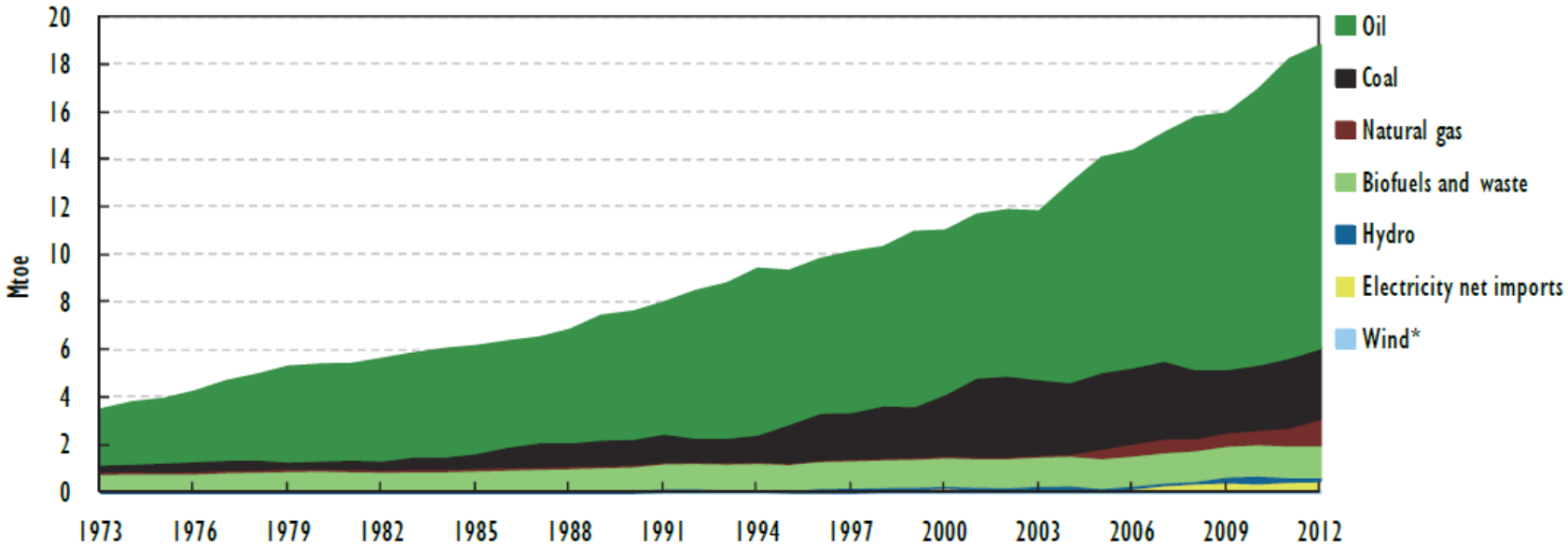


Site (8)

Stream power: 912.69 N/ms

Resource Use for Energy

Figure 2.1 TPES, 1973-2012

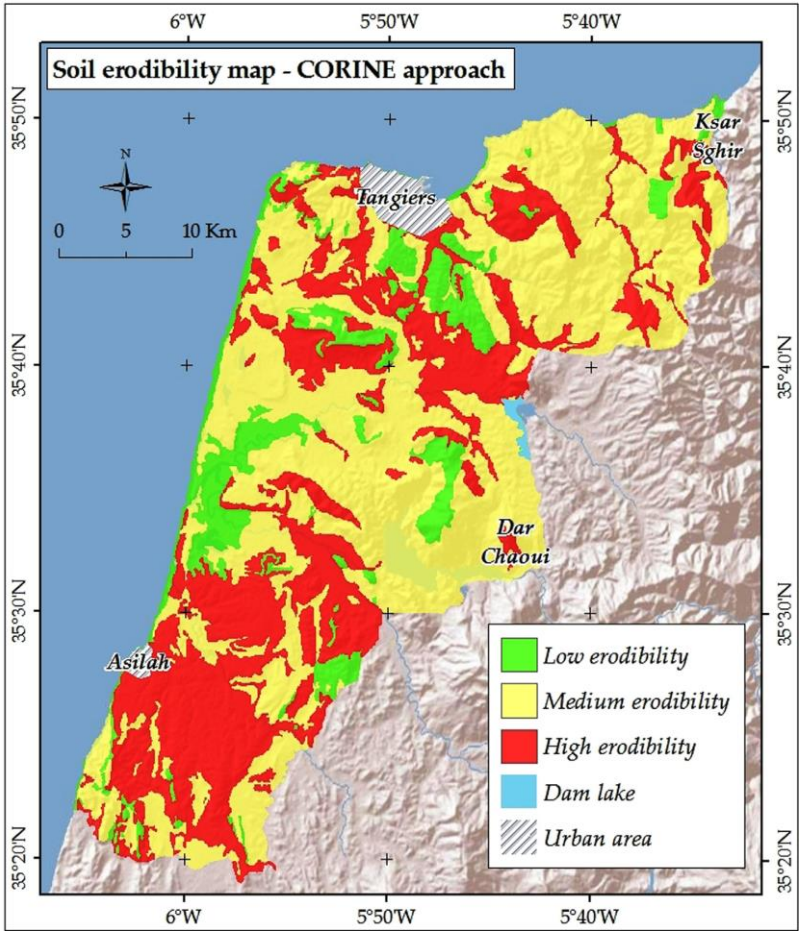


* Negligible.

Source: IEA (2013b), *Energy Statistics of Non-OECD Countries 2013*, OECD/IEA, Paris.

Soil Security

- **Soil Erosion**
  - Lack of vegetation
  - Wind and water
  - Freeze thaw
- **Soil Fatigue**
  - Fertilisers and Pesticides
  - Shallow low quality soil
  - Repeated planting



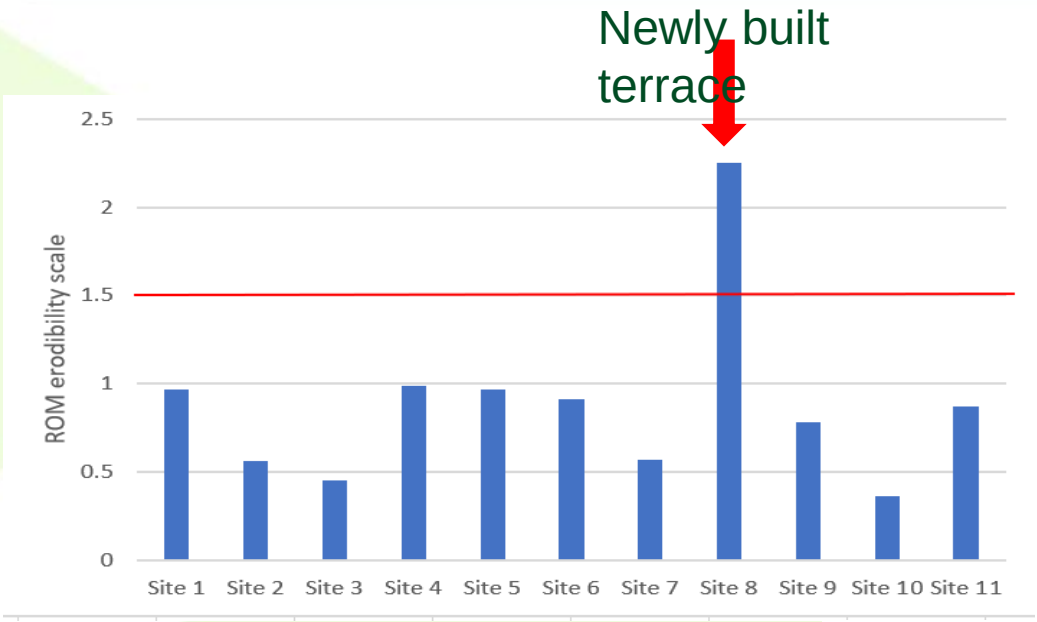
Rochdane et al. 2012

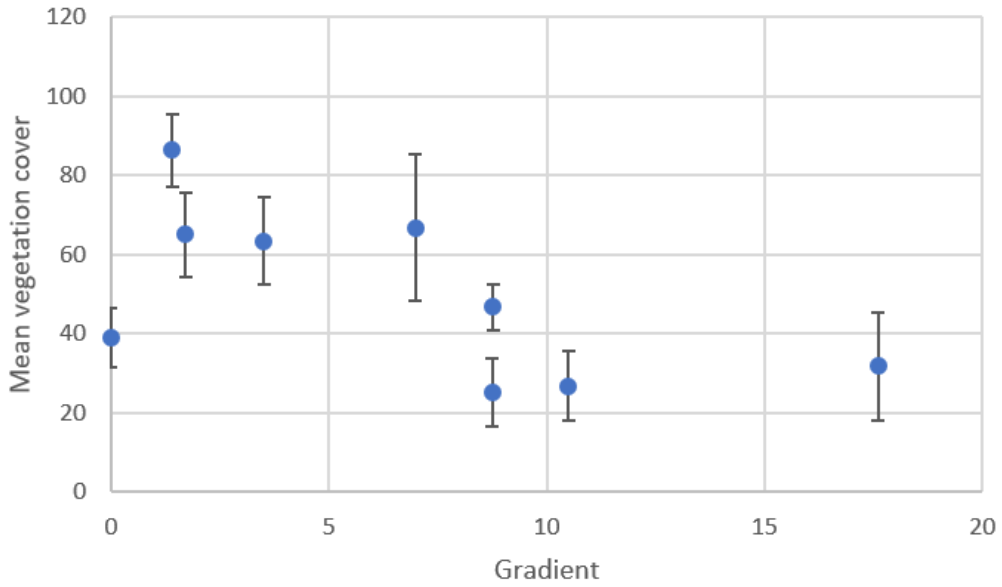
Challenging environmental conditions

- Extreme topography
- Prone to flooding
- Shallow Soils
- Seasonality:
  - Temperature
  - Precipitation
  - Snow melt

	January	February	March	April	May	June	July	August	September	October	November	December
Avg. Temperature (°C)	4.1	5.6	8.1	10.7	13.9	17.7	21.5	21.7	18.2	13.2	8.3	4.7
Precipitation / Rainfall (mm)	62	61	74	72	39	16	4	5	21	47	69	71

Soil Erodibility





Agriculture and Food Security

- Divided Agriculture
- Ageing farming population
- Low levels of education, male dominated.

Farming in the Atlas Mountains

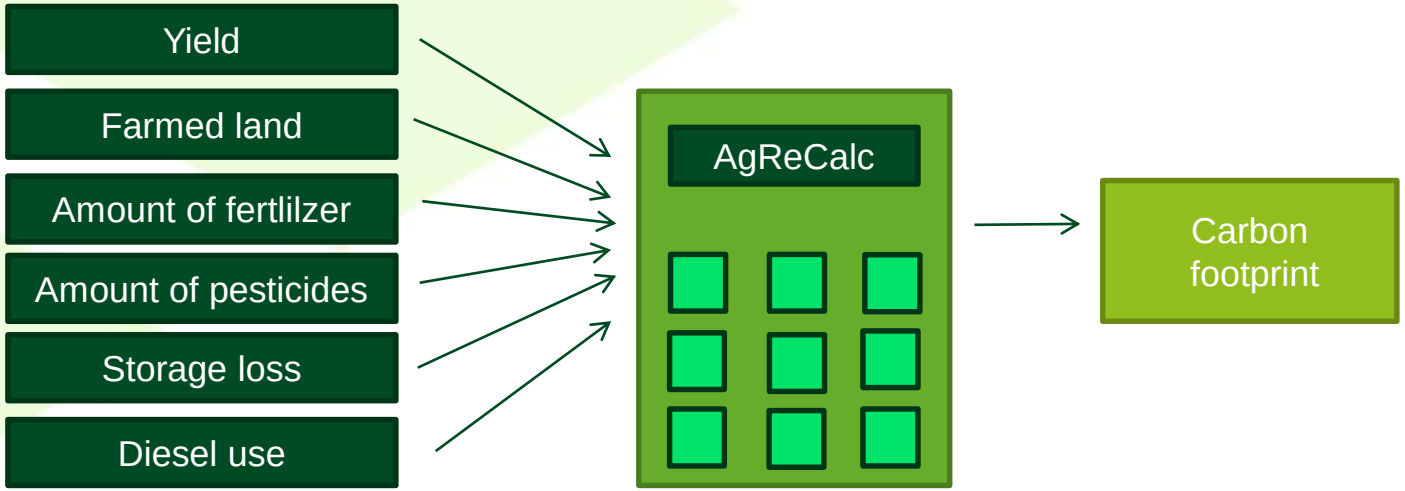
- Mediterrainian Climate, high mountain area (Ecomuseum)
- **Cereal** in winter/spring and **vegetables** in summer (Ecomuseum)
- **Cash crops**: cherries, apples, pear, walnuts
- **Natural fertilizer**: cattle, mules, donkey, goat, sheep (Ecomuseum)
- **Control pests**: pesticides and trees burnt
- **Agriculture practices**: 87% → 75%
- **Livestock rasing**: 51% → 43%
- Half of the families have at least one member who works in non-agricultural labor

(Kreuer and Mahdi 2015)

AgRECalc

- Identify carbon footprints of crop production
- Making more effiecent use of resources
- A resource use assessment also known as a carbon footprint shows the quanitity of GHG emissions produced from routine farm activities

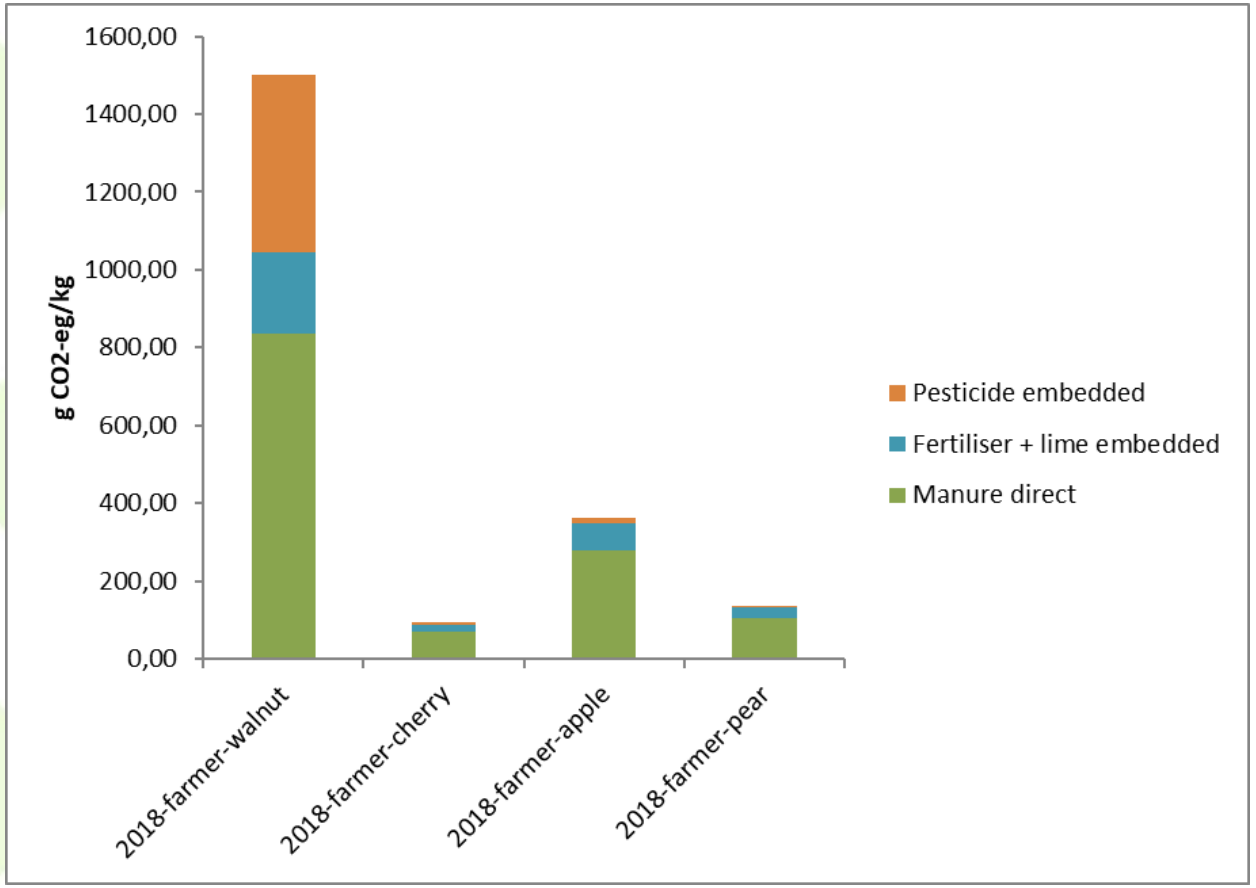
(*agrecalc.com*)



Interviewed farmers in Imlil 2017 & 2018

	Apple trees	***Apple yield (kg)***	**Cherry trees**	***Cherry yield (kg)***	**Walnut trees**	***Walnut yield (kg)***
Farmer 1	100	*N.A.*	200	*350-400*	50	*400*
Farmer 2	70	*1,200*	30	*200-300*	30	*200-300*
Farmer 3	100	*N.A.*	30	*100*	60	*400*
Farmer Z	20	*300*	10	*600*	15	*75*

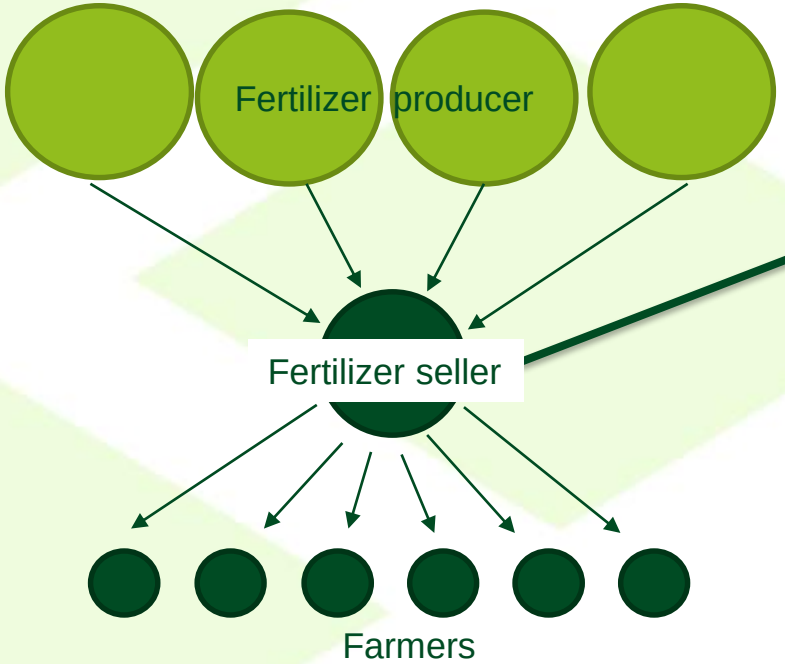
Farmer Z 2018

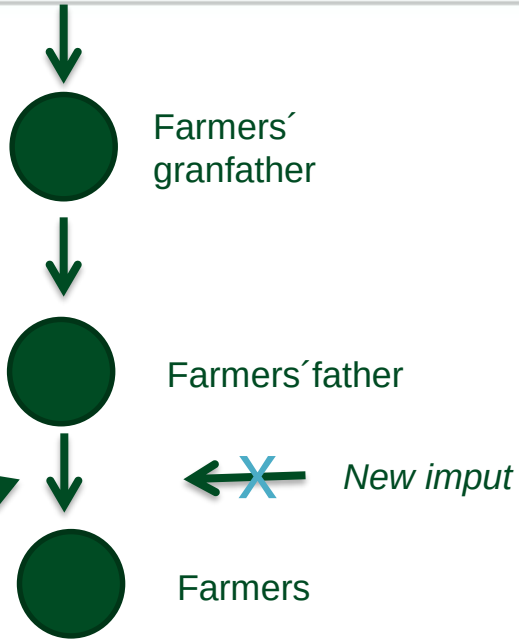


Training and Advice

Where do you get infromation about farming practices, e.g. If there are new fertilizers, persticides?

I get them always from my fertilizer seller.





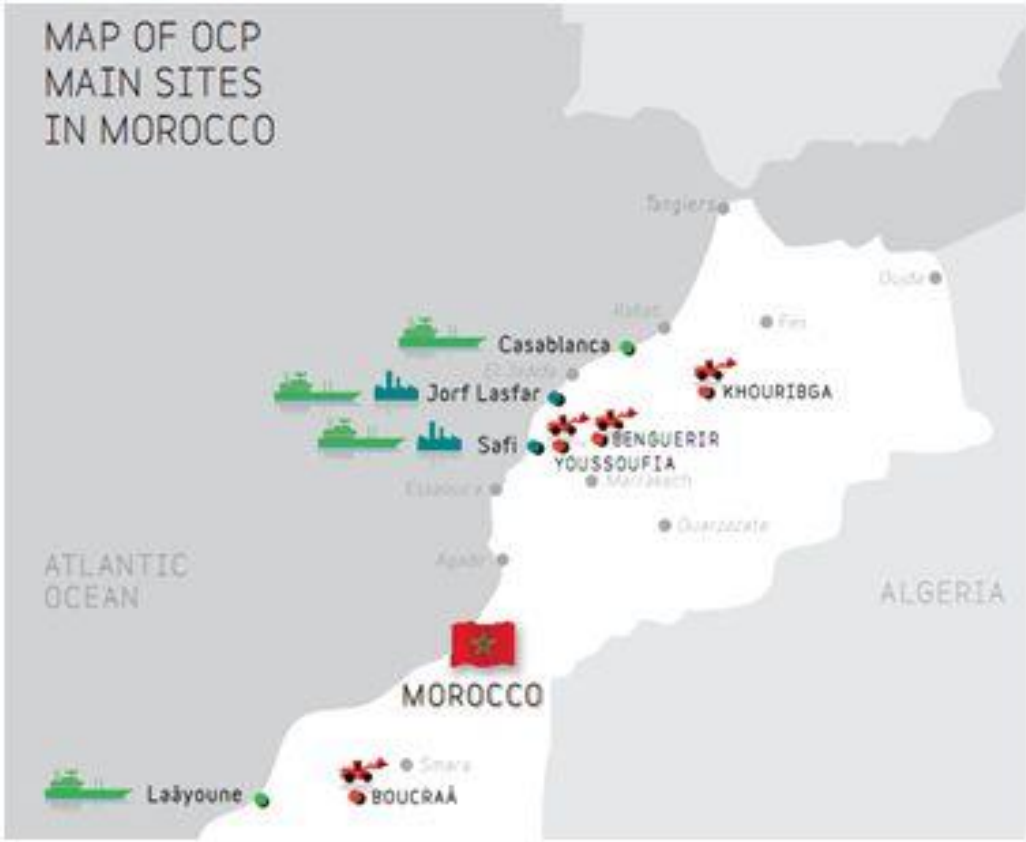
Will your children take on your farmland?

No, they don´t want to be farmers. One is becoming a police man and the other is studiyng engineering at the university.

Would you accept help – lets say from researchers – to improve farming methods?

I don´t accept help from others. I don´t even hire help. It stays in the familily. I learned farming from my father, he from his and so on.

Minerals and Mining



https://npk101.wordpress.com/2012/04/27/morocco-ocp-to-double-phosphate-production-by-2020/

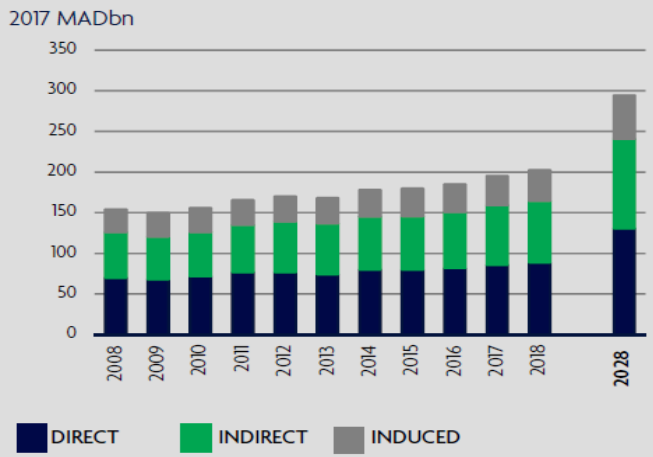
Tourism

WORLD RANKING (OUT OF 185 COUNTRIES):

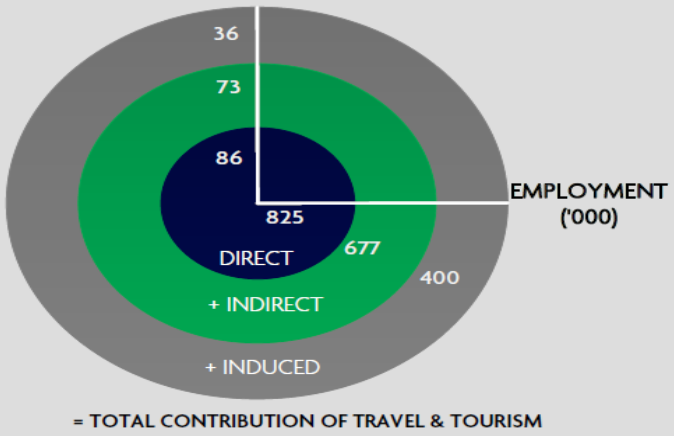
Relative importance of Travel & Tourism's total contribution to GDP

49	40	102	104
ABSOLUTE	RELATIVE SIZE	GROWTH	LONG-TERM GROWTH
Size in 2017	Contribution to GDP in 2017	2018 forecast	Forecast 2018-2028

TOTAL CONTRIBUTION OF TRAVEL & TOURISM TO GDP



BREAKDOWN OF TRAVEL & TOURISM'S TOTAL CONTRIBUTION TO GDP AND EMPLOYMENT 2017



https://www.wttc.org/-/media/files/reports/economic-impact-research/countries-2018/morocco2018.pdf

Urbanisation

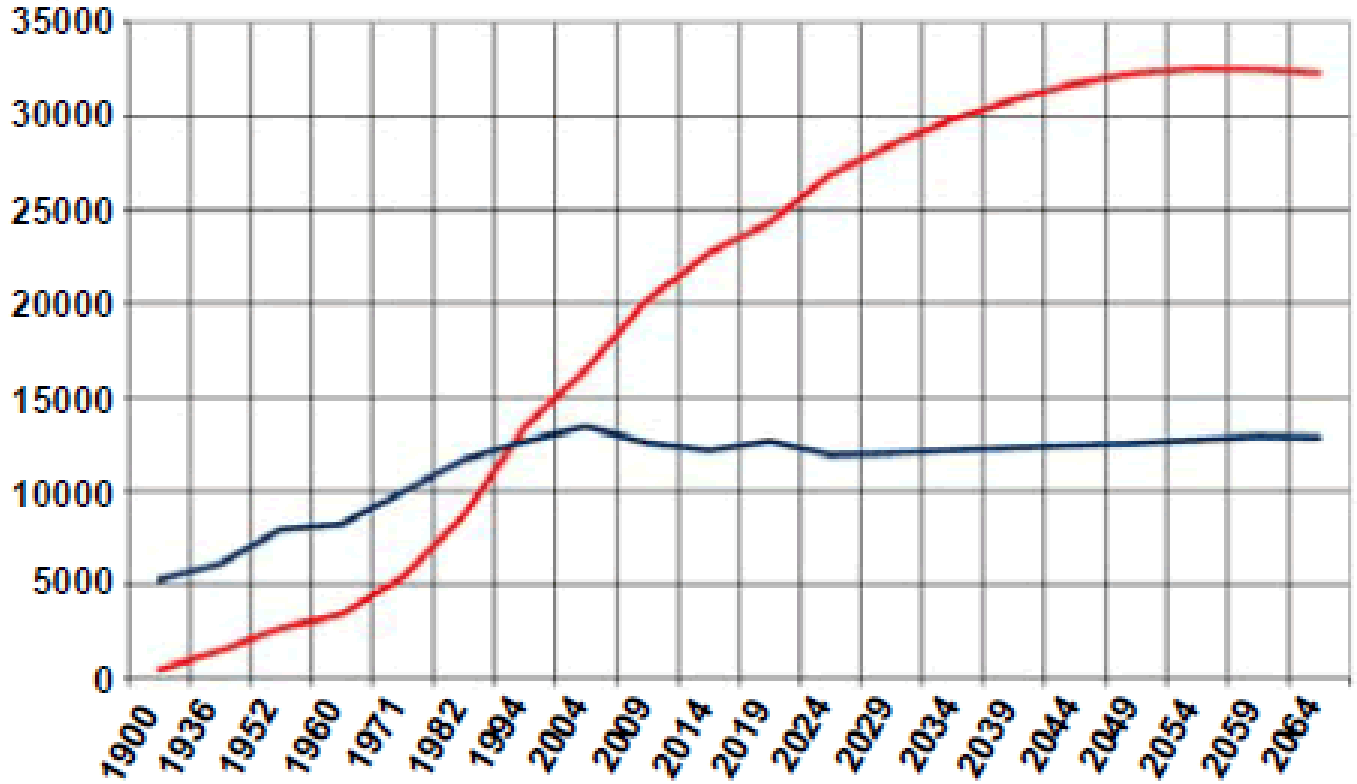


Figure 3: High Planning Commission.Note: Blue: rural areas; Red: urban areas.

https://www.omicsonline.org/articles-images/tourism-hospitality-High-Planning-5-224-g003.png

Tourism

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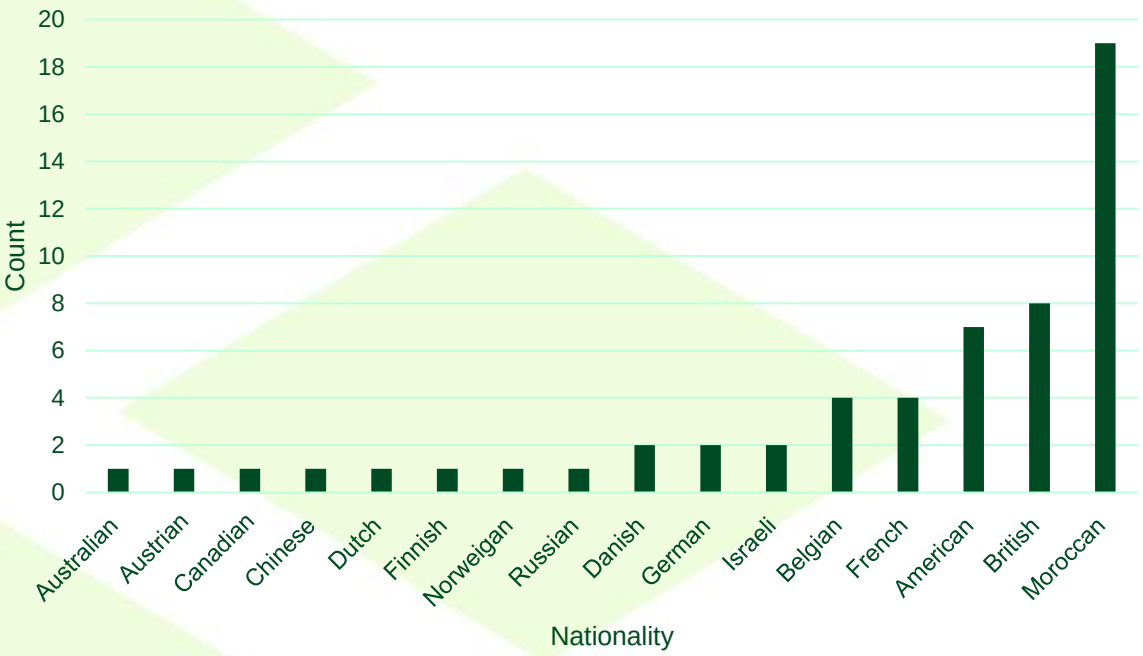
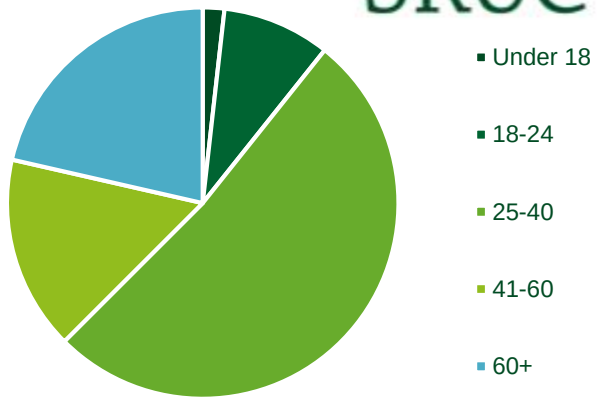
Morocco's 2020 Vision

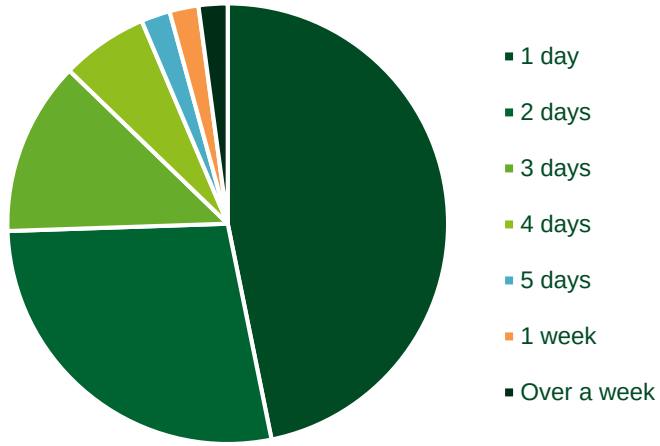
- Doubling the size of the sector
  - 200 000 new beds
  - Double touristic arrivals
  - Triple domestic trips
- 2nd economic sector :
  - 470 000 new direct jobs
  - Double touristic receipts to reach 140 billon DHs
  - 2 additional points to the touristic GDP

Proposed Destinations

MSc Results – Tourist demographics



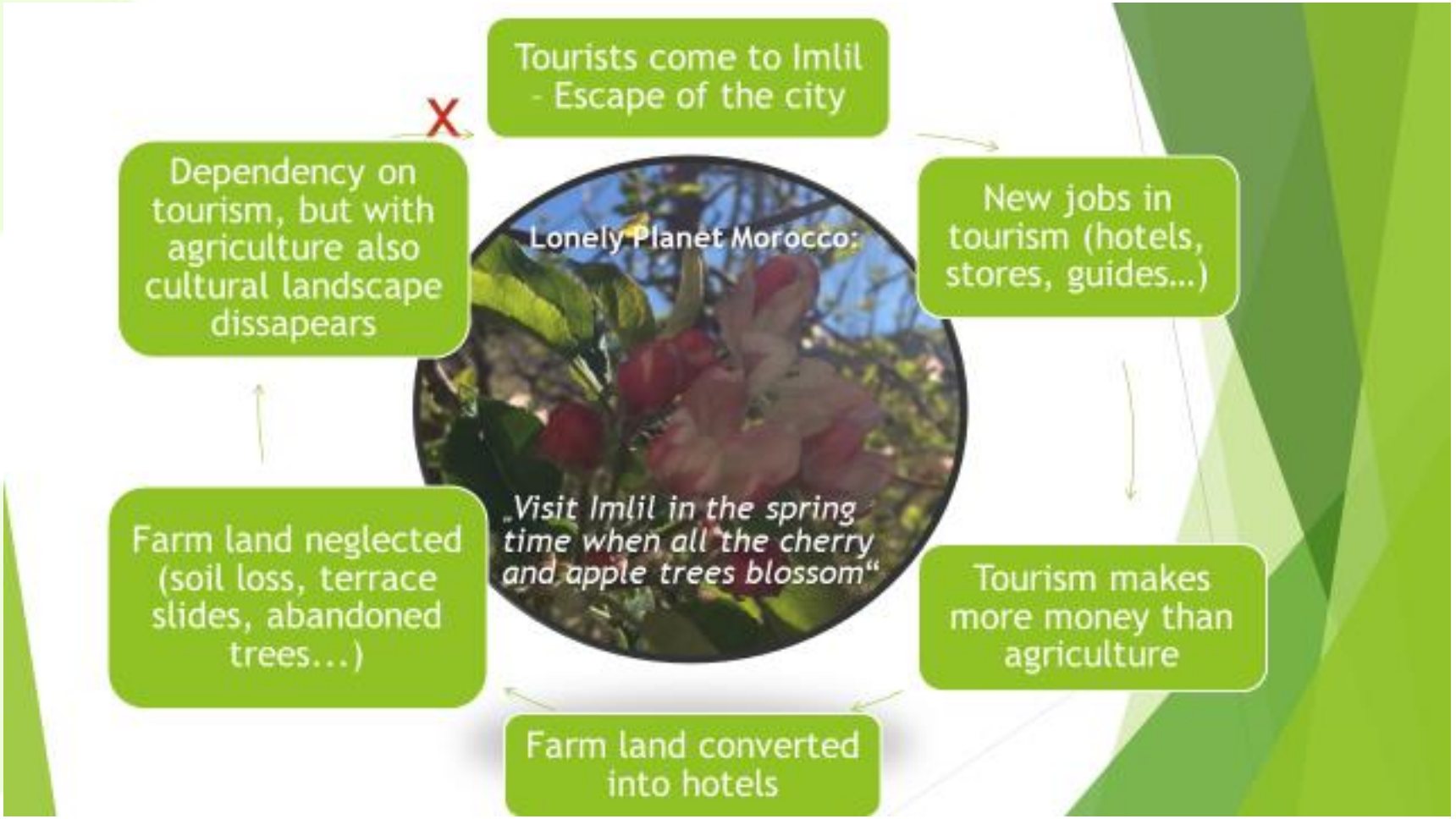




1st visit: 78.5%

Imlil and the High Atlas

Perceived Impact of Tourists



Waste Management

https://www.bioenergyconsult.com/solid-waste-management-in-morocco/

Imlil– rubbish and recycling

- Rubbish collection and disposal
  - truck collects rubbish every day from the village
  - to be burnt and buried either outside Imlil, or near Marrakech
  - Some recyclates sent to Marrakech
  - Kasbah contributes to both rubbish and recycling
- Mixed views on rubbish from Shopkeepers and tourists: "Very bad" vs. "Perfect"

- 32% -- Perfect
- 43% -- Very Bad
- 25% -- neutral or no perspective

Current Policy and Sustainability Focus

- EPA collaboration with Morocco

Progress and Innovation

- Education and engaging with communities
  - Education for all!
  - https://www.efamorocco.org/

- Marrakesh Organics
  - https://marrakeshorganics.com/

Acknowledgements

- Mike McHugo, Sidi and all at Discover Ltd.
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https://www.facebook.com/jennifer.carfrae/videos/10216542252130486/

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Thank you for your attention!

Any questions?

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