



Grant Agreement 823805 MAIL H2020 MSCA RISE 2018

Marginal Land definition (in MAIL project)



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T.2.1:Literature review and existing models

Objectives

- **synthesis** of the literature review
- establish a solid **scientific foundation** on which the next stages of **MAIL** project will be developed.
- identified **variables and groups of variables** defining marginal lands.
- We paid special attention to the contribution of **remote sensing** image analysis to the identification of marginal lands.

Secondees (5PM):

- Alfonso Abad (Cesefor) at Homeotech
- Bettina Felten (IABG) at Auth



Marginal Land definition

Main features

- Concept in development
 - Multi-causal
 - Dynamic
 - Goal-oriented
-
- Identification – variables



Development of the concept

- First approach (Ricardo and Hollander, SXIX): purely economic. Those first approaches define marginal land as the poorest lands which are used above the margin of rent land payment (poor soil or other limiting conditions for agriculture, e.g. steep slopes).
- Peterson and Galbraith, (1932). Payed more attention to the influence of location in land's profit
- During the 20th and 21st century the economic dimension of marginal lands has been enriched by adding new variables related with markets, policies and technologies
- The marginal land concept has continued evolving parallel to the concept of ecosystems functions. Thus, the sustainability concept or ecological dimension was integrated into the marginal lands concept as well.
- This concept has evolved to meet multiple management goals and to incorporate environmental protection, preservation of ecosystem services and long-term sustainability

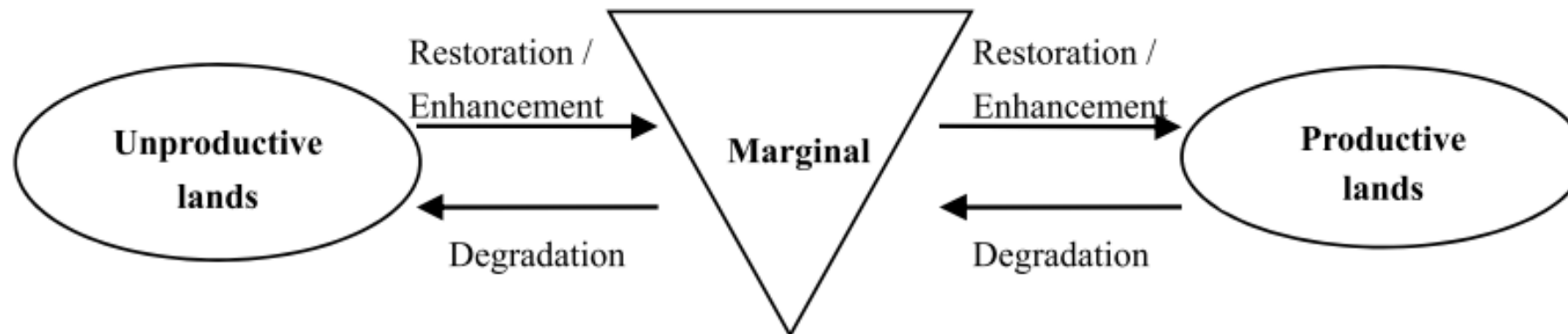


Multi-causal

- **Complex matter:** interacts at many scales, both spatial and temporal
- May arise from unfavorable environmental, cultural, social, political and economic factors
- Environmental (including biophysical factors related to the biological production)
- Economic ,demographic and cultural factors (migration, aging):
 - abandonment of economically marginal lands in mountain areas due to demographic change
 - abandonment of traditional low-intensity farming systems (Extensive grazing is especially suitable for marginal lands)

Dynamic concept

Lack or inadequate management in many cases produce land degradation, and marginalized lands can be enhanced or restored to productive lands by improving land functions

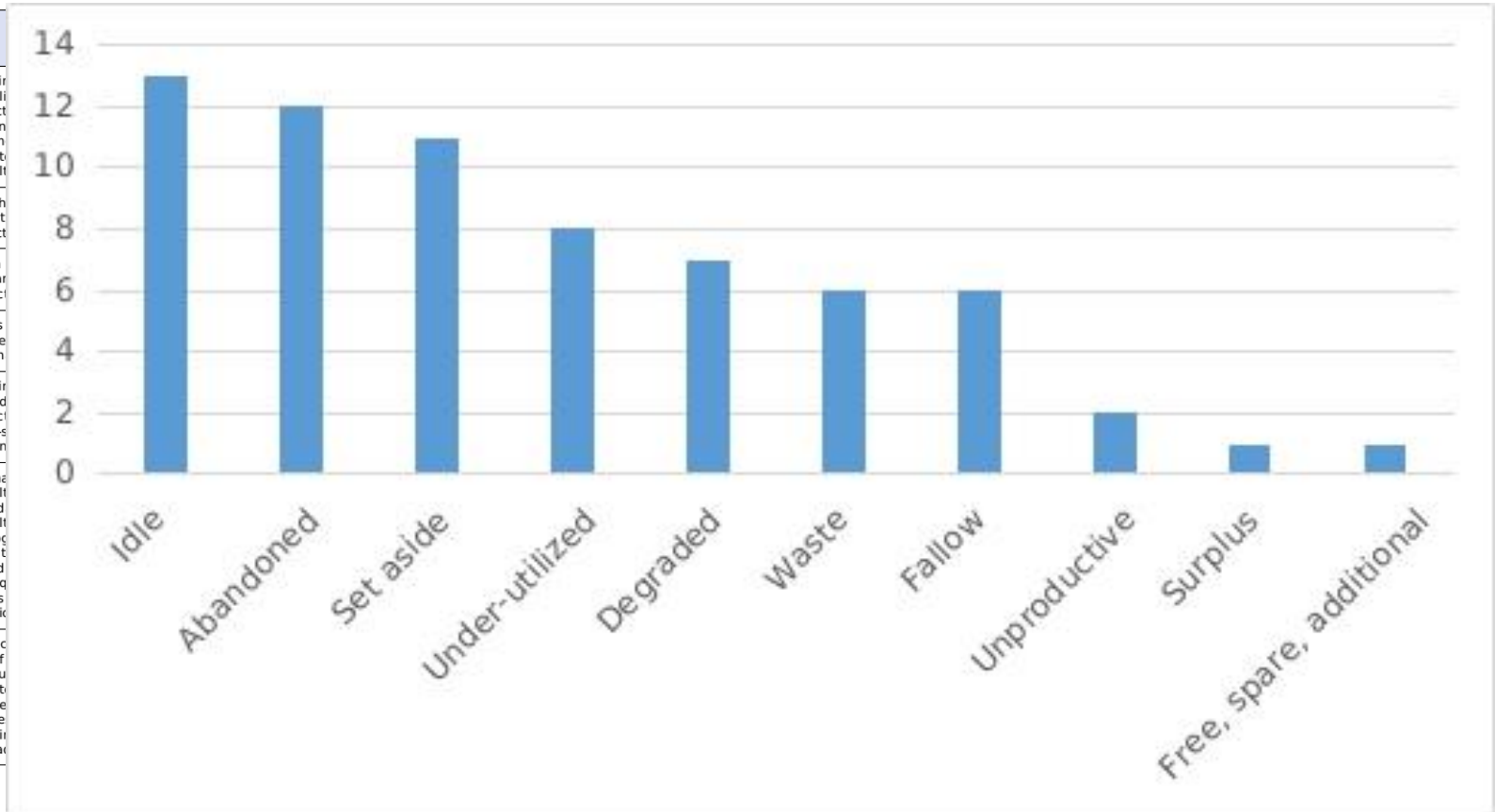


Land classified as marginal in a given place or time might be considered as productive (non-marginal) in a different spatio-temporal context

Goal - oriented

Author	Definition	Approach
Ricardo (1817)	Land rent law: A land will be used first since its cultivation relative to poorer quality land results in lower production costs at higher yields.	Economic
Hollander (1895)	"[...] the poorest lands utilized above the margin of rent-paying land".	Economic
Peterson & Galbraith (1932)	"[...] margins of cultivation, where revenues are equal (or lower than) the cost of production".	Economic
Heimlich (1989)	"Marginal lands generally refer to the areas not only with low production, but also with limitations that make them unsuitable for agricultural practices and ecosystem function".	Environmental
Hamdar (1999)	"The land capability classes from IV to VIII characterized by high soil erosion or with some restrictions were generally categorized as marginal lands"	Environmental
Strijker (2005)	"[...] marginal lands have been defined as the land uses at the margin of economic viability".	Economic
Schroers (2006)	"[...] an area where a cost-effective production is not possible, under given site conditions, cultivation techniques, agricultural policies as well as macro-economic and legal conditions".	Economic
Bertaglia et al. (2007)	"marginal areas are defined as those areas where possible land uses are relatively limited because of higher altitude, shorter growing season, steeper slopes, less fertile soils or broadly speaking because of generally lower soil productivity."	Environmental & Economic
Macdonald & Macdonald (2009)	"The sense in which this paper uses the term 'marginality' relates to the physical terms of land and climate and the effect on land-related human activity of the environmental limits imposed by these"	Cultural

Author	
Milbrandt & Overend (2009)	"Margin poor cli character They in extrem steep to agricult
USDA-NRCS (2017)	"[...] th restrict charact
Dale et al (2010)	"[...] a yield ar product
Tang, Xie & Geng (2010)	"[...] is cost/be margin
James (2010)	"Margin be land product it is ill-s cropping
Cai et al. (2011)	"[...] ha agricult degrad agricult is recog which t related techniq well as conditi
Plieninger & Gaertner (2011)	"[...] ec land of other u subsist may de service "margi "degrad





Policies

There is no single definition of marginal lands. In the same way, such definition does not exist in the European policy landscape.

- Less Favoured Areas Directive. LFA are those where there are limited possible land uses because of altitude, short growing season, steep slopes, infertile soils and low productivity.
- European Rural Development Policy and Common Agricultural Policy. Capacity to modify abandonment of uses and depopulation trends that may lead into marginality
- Land Use, Land Use Change and Forestry (LULUCF) regulation (2018/841). It establishes a land-based approach for accounting the emissions and removals from the sector in five land accounting categories: (1) afforested and forested land; (2) managed cropland, grassland and wetland; (3) managed forest land; (4) harvested wood products; and (5) natural disturbances

Examples

Grasslands / partially forested areas



(Mr. Lampros' personal collection, 2012)

Abandoned agricultural areas



(Mr. Lampros' personal collection, 2012)

Examples

Open mine restoration areas



(Mr. Lampros' personal collection, 2015)

Quarries



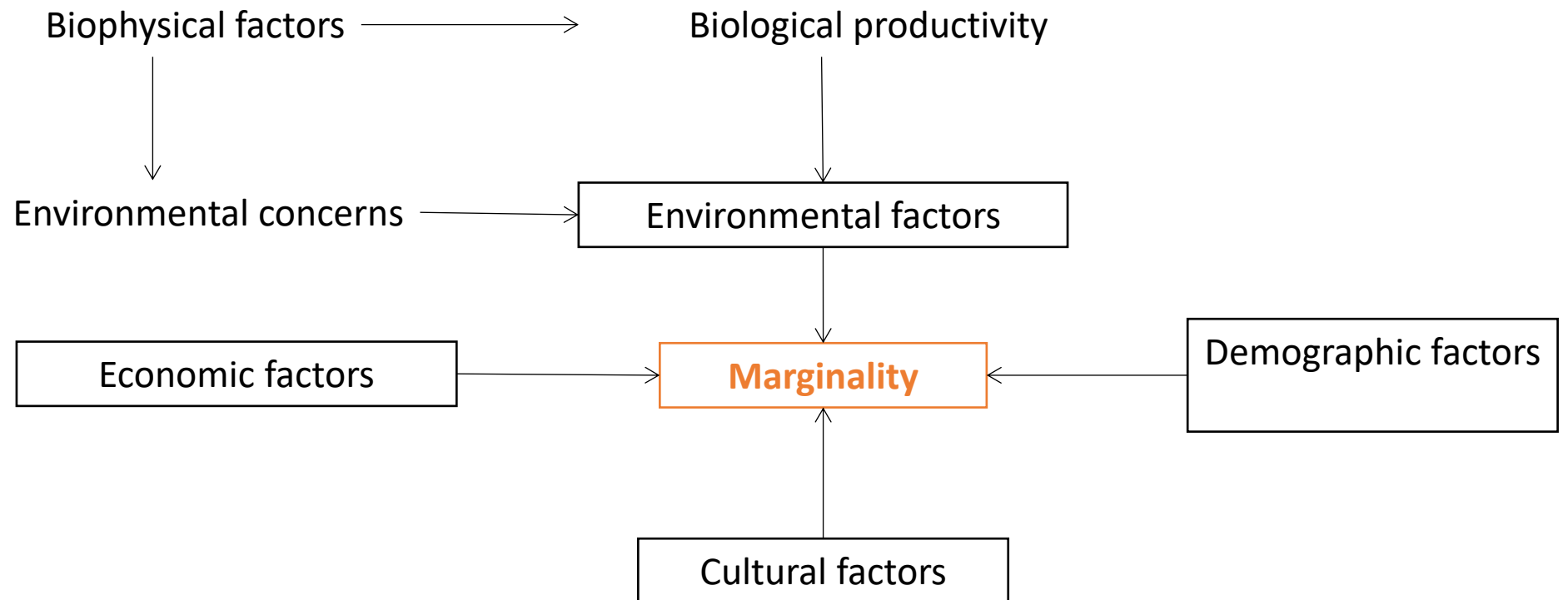
(Mr. Lampros' personal collection, 2017)



Identification

Current methods for identifying marginal lands follow the same trend as marginal land definition; **methodologies are diverse** and reflect specific management **goals**.

- soil characteristics
- climate
- terrain





Identification

Study	Environmental variables				Product ivity	Land cover/ use	Socio- econo mic
	So il	Clim ate	Terr ain	Sustaina bility concerns			
Bai et al. (2008)		✓			✓	✓	
Bertaglia et al. (2007)						✓	✓
Cai et al. (2011)	✓	✓	✓			✓	
Ciria et al. (2018)	✓	✓			✓		
Gelfand et al. (2013)	✓	✓	✓			✓	
Gerwin et al. (2018)	✓	✓	✓	✓			
Gopalakri shnan et al. (2011)	✓		✓	✓	✓	✓	
Kang, Post, Wang et al. (2013)	✓	✓	✓	✓	✓		✓
Li et al. (2017)	✓	✓	✓	✓		✓	
Liu et al. (2011)	✓		✓			✓	
Milbrandt & Overend (2009)	✓	✓	✓			✓	
Niu & Duiker (2006)				✓	✓	✓	

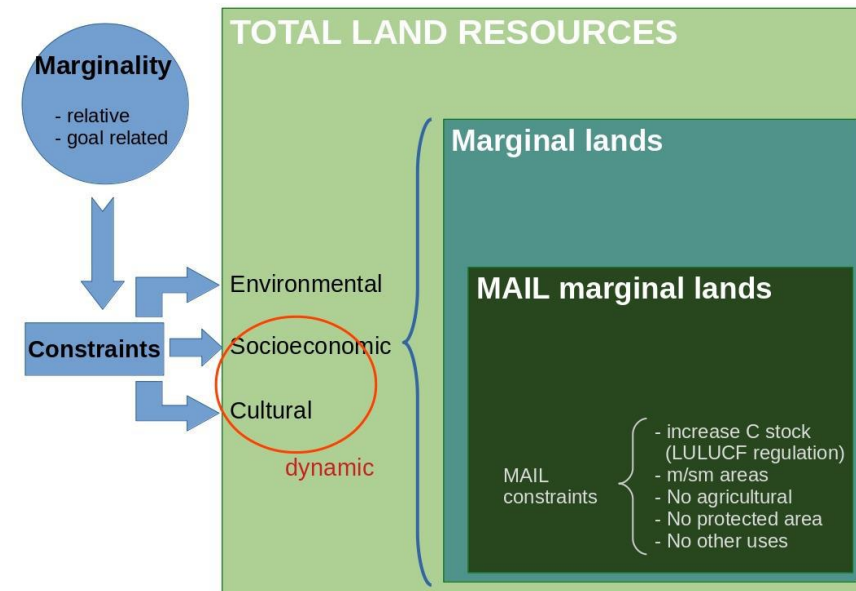
Group of variables	No of times variable is used	No of times variable is used and related to RS
Environmental		
Soil	80	27
Climate	9	1
Productivity	4	4
Sustainability concerns	9	3
Terrain	17	14
Sub total	119	49
Land cover	9	8
Socio-economic	9	1
Total	137	58



MAIL definition

Marginal land definition:

- Dynamic concept
- 30 different definitions found
- Goal-oriented (e.g. Mail project):
 - Agricultural lands
 - Protected areas
 - LULUF accounting
 - Definition:





To sum up, marginal lands for the **MAIL** project are:

Lands with significant, either environmental (biophysical variables) or socioeconomic, constraints and with potential to impact national accounting for C stock, excluding agricultural lands and other valuable areas (protected areas, uses with local importance etc.). Dynamic and variability are key concepts for marginal land identification.

Examples of these areas include, but are not limited to, degraded and / or abandoned lands, lands with naturally low productivity due to biophysical constraints, and other degraded lands that have not (yet) been converted to other uses, e.g. post-industrial and post-mining sites.

In a complement approach, fully consistent with the **MAIL** project objectives, we will consider Marginal Lands those whose land use allows, according to accounting rules referred in the EU commitment and the regulation developed (European Parliament. Regulation (EU) 2018/841) and land use categories proposed by the 2006 IPCC guidelines (IPCC. (2006)), to maximize the increase of carbon stock. That is, **MAIL** project will focus on areas in which it is possible to convert them to forest lands (Land Converted to Forest Land: *afforested lands*).

Therefore, it can be considered Marginal Lands, grasslands (including systems with woody vegetation which do not comply with minimum values for the variables specified in the Annex II for each country), abandoned croplands or other lands (bare soil, rock, ice, etc.), excluding from them those with social-economic activity, environmental protection or with legislative restrictions.



MAIL definition



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Thank you for your attention!



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