Reforestation of riverbanks in overflow and flood control works in Peru

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Abstract

The rivers of the Peruvian coast are characterized by a marked seasonality, with low flow rates during much of the year, with the exception of summer, a season in which they increase significantly due to rainfall. When rainfall is moderate, it produces overflows and floods, events that have intensified due to climate change and natural phenomena. These floods damage infrastructure, property, and can even cause loss of life.

The government of Peru, in order to prevent the damage caused by natural disasters, has been executing overflow control works in coastal rivers that were affected by the Coastal El Niño Phenomenon (2017). When these interventions cause significant impacts and are also included in the list of projects of the National Environmental Impact Assessment System, an IGAPRO (Environmental Management Instrument for Construction Interventions) is required, whose evaluation is carried out by SENACE (National Environmental Certification Service for Sustainable Investments).

In most of the IGAPROs evaluated (from 2019 to 2024), the reforestation of riverbanks was included as a complementary measure (in 40 of the 54 approved IGAPROs), to control river erosion and provide resilience to physical infrastructures, adding a total of 316.98 ha of riparian areas to be reforested, distributed in 11 rivers and 21 streams. The main riparian species chosen were: *Vachellia macracantha, Tessaria integrifolia, Schinus molle, Neltuma pallida* and *Baccharis salicifolia.*

Introduction

Peru's coastal rivers are characterized by marked seasonality, with low flows for much of the year, except in the summer, when they increase significantly due to rainfall. When moderate rainfall happens, it causes flooding and overflows which are events that have intensified due to climate change and natural phenomena. These floods damage infrastructure and property and even cause loss of life.

Objectives

The research objectives were:

• To determine the area to be reforested in each river basins.

• To identify the number of rivers and streams to be reforested.

• To present the main plant species selected for riparian reforestation programs.

Materials

Riparian defense projects (from 2019 to 2024) that included reforestation programs ("*Natural infrastructure*"). Of the total number of approved projects (54), 40 included riparian reforestation programs.

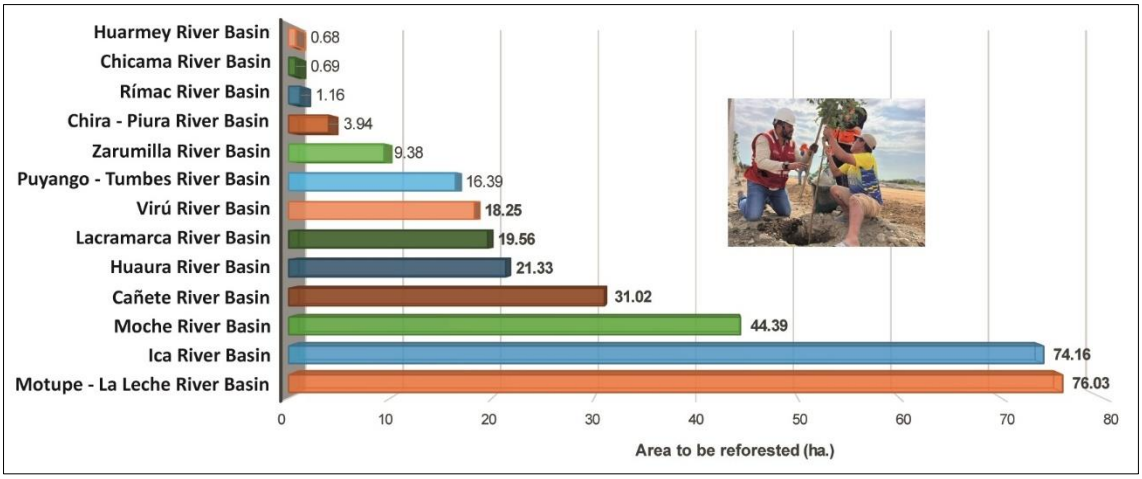
Methods

It consisted of a review of riparian reforestation programs, analyzing the location of the areas to be reforested, their area, plant species to be used, number of seedlings, among other aspects.

Results

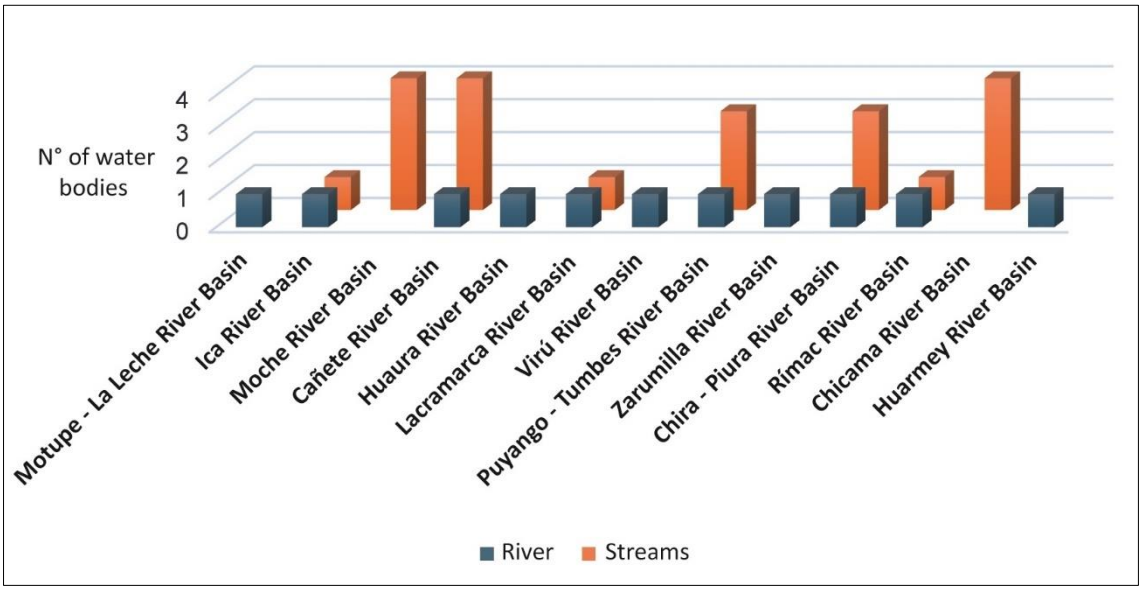
Area to be reforested by river basin:

Thirteen river basins will be reforested on the Pacific coast of Peru. The largest areas to be reforested will be in the following river basins: "Motupe - La Leche River" (76.03 ha), "Ica River" (74.16 ha), "Moche River" (44.39 ha), "Cañete River" (31.02 ha), and "Huaura River" (21.33 ha). The river basins with the largest reforestation areas are those that presented the greatest number of riparian defense projects (dams, walls, among others).



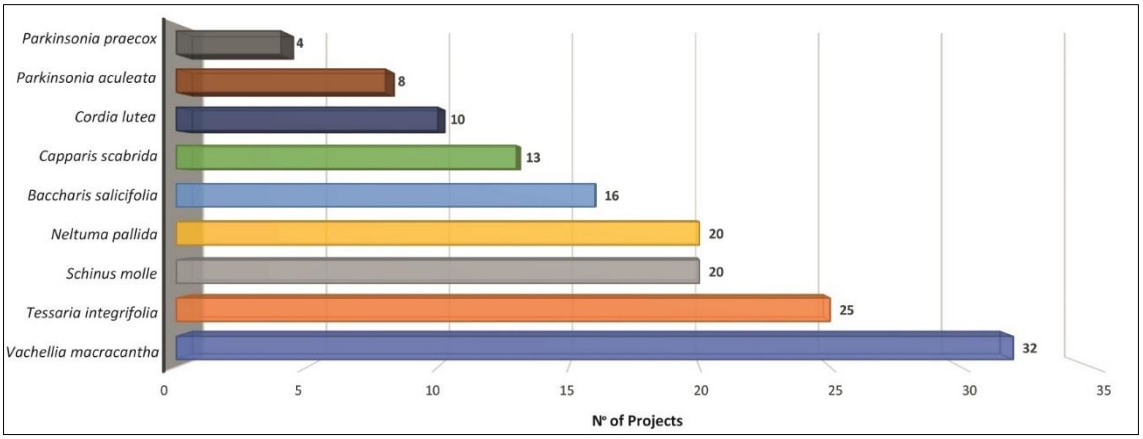
Number of rivers and streams to be reforested:

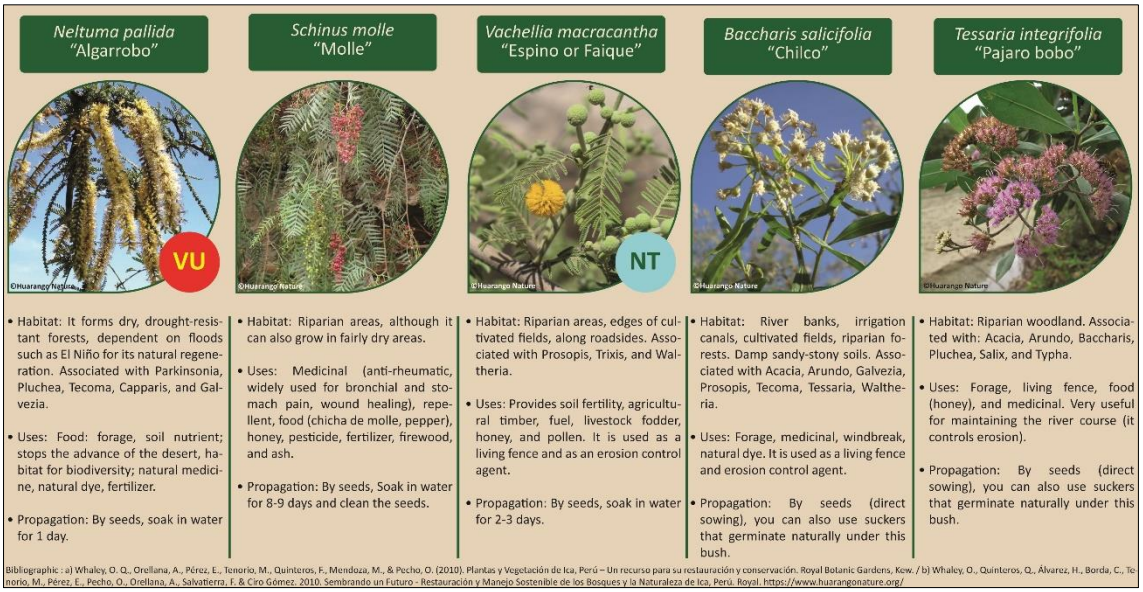
The riparian reforestation programs will include 11 rivers and 21 streams (32 water bodies in total, corresponding to 13 river basins).



Main species selected for the riparian reforestation programs:

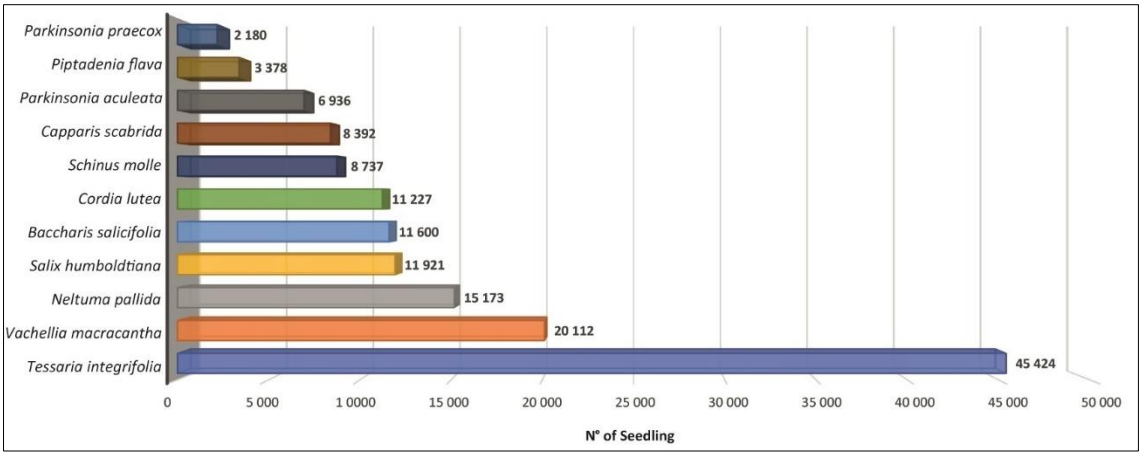
The 5 main selected plant species are typical of the riparian ecosystem. The remaining 4 species are native to dry forests and arid areas (associated with intermittent streams). The majority are tree species, and only 2 (*Tessaria integrifolia* and *Baccharis salicina*) are shrubs.





Number of seedlings per species considered in riparian reforestation programs:

The species with the largest number of seedlings to plant was *Tessaria integrifolia*. This species, along with *Baccharis salicifolia*, are shrubs that grow on the banks of rivers and streams adapted to flooding). The other species grow mainly on the banks or marginal areas of the river, while *Cordia lutea, Parkinsonia praecox*, and *Capparis scabrida* are distributed in arid areas, as well as alluvial plains.

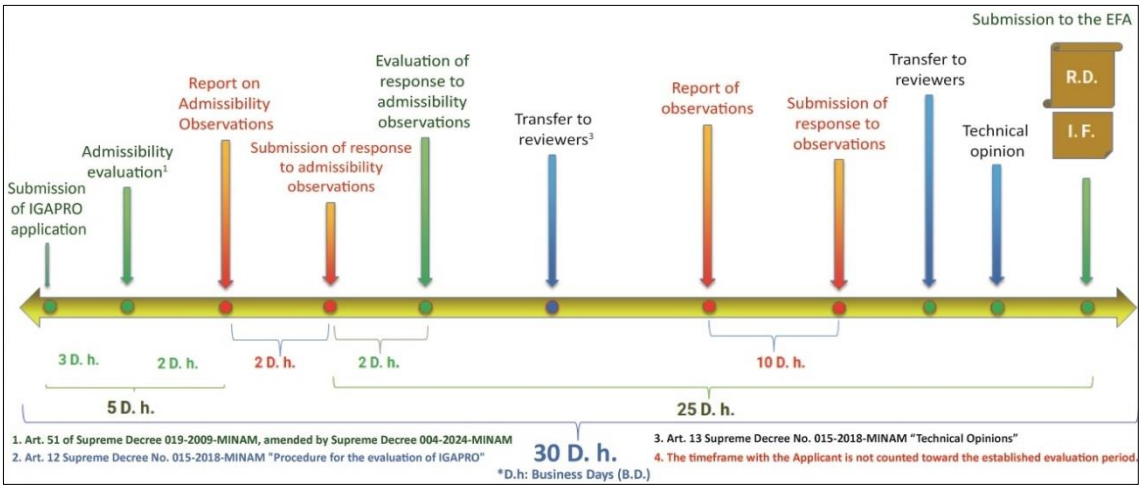


Glossary:

- SENACE (National Environmental Certification Service for Sustainable Investments).- It's a public organism that evaluates and approves Environmental Impact Studies (EIS) of investment projects in the mining, energy, agriculture, production, and housing sectors, among others.

- IGAPRO (Environmental Management Instrument for Construction Interventions).- It's a type of environmental study related to projects (linked to the agriculture, transportation, health, sanitation and housing sectors) that aim to prevent and control the impacts caused by natural disasters.

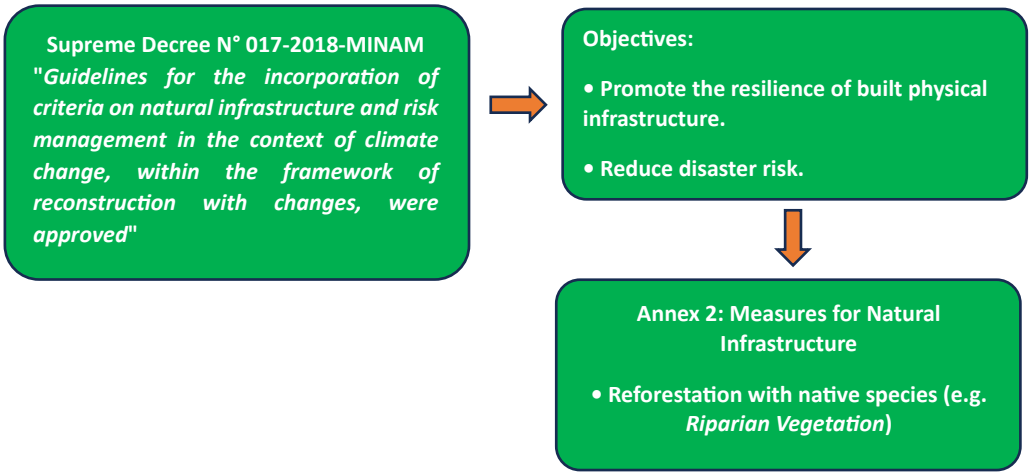
Flowchart for the evaluation of an IGAPRO



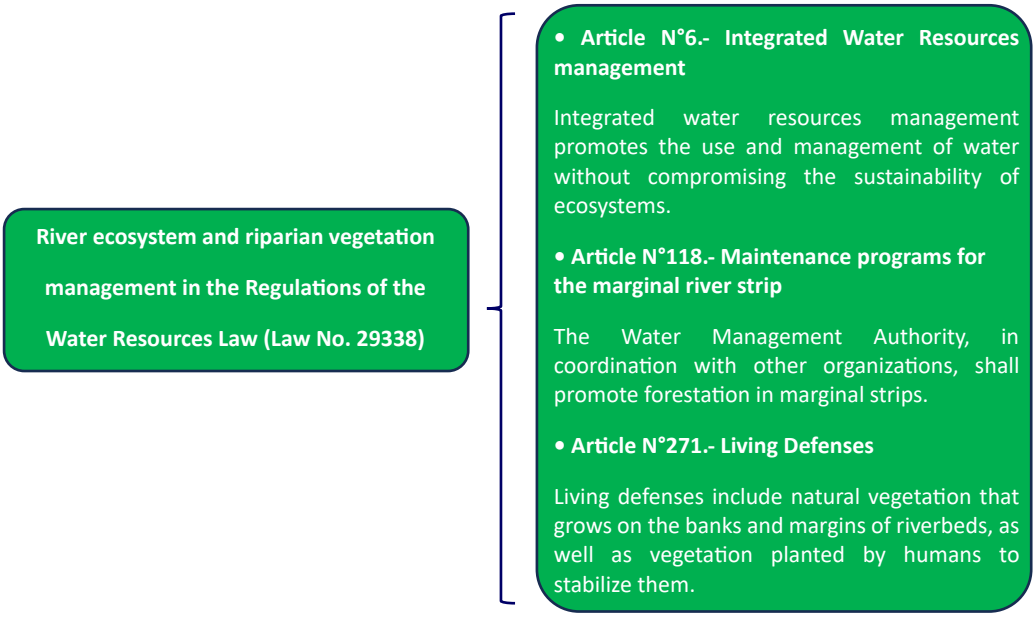
- ANIN (National Infrastructure Authority).- It's a public organism created in 2023, responsible for the development, execution, and maintenance of investment projects under its responsibility.
  Riparian defense projects.- Riparian defense projects primarily involve the construction of dikes or walls and channel dredging. In addition, the reforestation of the banks is carried out, also known as "*natural infrastructure*" or "*living defense*".

- Natural infrastructure.- This is the network of natural areas (e.g., riparian vegetation) that preserve ecosystem values and functions, providing ecosystem services. The implementation

of natural infrastructure measures aims, among other things, to reduce disaster risk (Supreme Decree No. 017-2018-MINAM).



- ANA (National Water Authority).- It is the governing body and the highest technical-regulatory authority of the National Water Resources Management System.



Poster exhibited at IAIA 2025