Land reclamation: soil protection and sustainable agriculture.

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The term reclamation immediately conjures up images of land wrested from the swamp, areas that have been redeemed and made healthy, habitable, and cultivable by man. It is certainly an activity with roots that go far back in history, and has always been a driver of growth.
Whether it involves land transformation or land conservation, reclamation is synonymous with quality land. Just think of the works carried out for the development of cities, industry, and agriculture: the drainage of brackish water, the creation of irrigation networks, surveillance activities, and hydraulic regimentation…
Today, in the face of a territory heavily impacted by man, reclamation increasingly means meeting the challenges of sustainability and preserving the balance between human activity and respect for natural resources, with an approach that focuses on a combination of technical, economic, and social aspects. In light of climate change concerns, it is also important to focus on optimal management of water resources, the availability and distribution of which are negatively affected by rising global temperatures, and the resulting extreme weather events, such as droughts and floods.
The commitment to land protection for sustainable development is part of the UN 2030 Agenda itself. Goal 15 "Life on Land" reads: *Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss.*
In particular, target 15.3 states: *Combat desertification, restore degraded land and soil, including land affected by desertification, drought and floods, and strive to achieve a land degradation-neutral world.*
These salient and challenging topics give one pause, given the urgency, as well as the difficulty of achieving these goals. The issue is certainly complex, and needs to be approached with a future-oriented logic, consisting of investments, research, and intervention planning, with a decreasing reliance on emergency response.
And it is precisely in this universally-recognised need to protect land and water resources that the topicality of land reclamation comes into play.

Land protection and development plans

The first evidence of irrigation and land reclamation works in Italy dates back to Etruscan and Roman times, although a real plan for the agricultural development of the territory arose more recently, immediately following the Unification of Italy, and continued up until what is considered the beginning of modern land reclamation in our country. A little more than a century ago, in 1922, scholars and politicians got together to nail down the objectives of an activity that would reshape the territory of Italy and its economy, with the reclamation of unhealthy and unproductive territories, and the construction of water conveyance and irrigation works.
In other European countries, land reclamation activities began at different times, depending on the characteristics of the territories and the specific needs, but they always marked an economic and social advancement thanks to the creation of water conveyance systems to protect the land against flooding and erosion, or irrigation works to increase agricultural productivity.
The Land Reclamation and Irrigation Consortia operate within this context. Thanks to their ongoing activities in the fields of water risk reduction, soil protection, and water management, these bodies play a strategic role in the protection and improvement of the territory, not only in Italy, but also in many other countries as well. This not only entails taking care of water infrastructures, such as waterworks and artificial canals, but also deploying innovation and research for increasingly sustainable water use.

Agriculture and irrigation: an unbreakable bond

The figures for 2023 speak for themselves: the availability of water for agricultural use has decreased by 15% with respect to the historical average annual value, mainly due to prolonged periods of drought. Climate change has led to more unpredictable rainfall and higher average temperatures, putting a strain on the country's water resources.
The scenario is not much different in many other European countries, and the forecasts indicate that this trend could continue, with a potential 20-30% reduction in water availability by 2050.
This situation makes the bond between the agricultural sector and irrigation unbreakable. Moreover, given the scarcity of water, it is necessary to use efficient irrigation practices, and to implement integrated water management systems. Drip or low-volume irrigation, which delivers water directly to the roots of plants, is an increasingly popular way to optimise the use of this resource. Not to mention new monitoring systems and the reduction of losses in irrigation systems. In the field of reclamation, new water sources to reduce dependence on traditional water resources are also being explored. From the desalination of seawater to the reuse of wastewater, today's technology makes it possible to render these sources safe and reliable for agricultural irrigation, thus helping to improve water security.

Technological solutions for the reclamation sector

In the face of climate change and the need for concrete solutions for drought mitigation, it is crucial to be able to rely on advanced technological solutions that enable the mindful and intelligent use of water resources.

From the protection of the territory to the catchment and management of the water cycle, the irrigation of crops, and the removal of excess water from land, the reclamation Consortia find themselves playing a complex role and providing a multitude of services. Hence the need to renovate and increase the efficiency of their pumping and distribution plants with improvements to the plant engineering and water conveyance aspects, in order to render the operations more sustainable, reducing operating costs and simplifying maintenance.
Caprari's experience and know-how in fluid handling also represent an important added value in this sector, in both the design and construction phases of the pumping stations.
We always begin with a thorough analysis of the existing plant and the customer's needs, with the aim of matching the plant to the service requirements, overcoming any physical limitations that may hinder the work.
Thanks to its considerable experience, Caprari is even able to constantly support the contractor during the construction phase, ensuring the proper installation of the pumping units and, in particular, an efficient water conveyance and electrical set-up.

THE STRENGTHS OF VERTICAL PUMPS: VERSATILITY, EFFICIENCY AND RELIABILITY AT THE SERVICE OF SUSTAINABLE AGRICULTURE

Vertical pumps are emerging as the most suitable choice for agricultural reclamation.
These efficient and reliable pumps offer several advantages for agriculture and for the sustainability of water access and distribution operations.
One of their greatest strengths is their **flexibility in terms of depth of extraction**. Vertical pumps can adapt to the specific needs of an agricultural area, as they work well both in shallow wells and at considerable depths. Thanks to their design, they make it possible to optimise space, and are also ideal for confined spaces. This versatility naturally means that they can be used in a wide range of contexts and applications.
Another equally important aspect is their **efficiency**. This is a crucial concept when it comes to energy savings, or rather keeping the costs of an installation down and reducing its environmental impact.
Efficiency means using less energy to pump the same amount of water. In this respect, vertical pumps are particularly advantageous: opting for this type of pump means ensuring high efficiency and **low operating costs**, in line with the goal of **sustainable agriculture**.

Product focus: P-series vertical lineshaft pumps

The P-Series vertical lineshaft pumps are the product of choice in the field of reclamation.
This range encapsulates all of Caprari's experience in terms of construction design, quality, and flexibility of use. These pumps are also ideal in other areas: waterworks, industrial water circulation, domestic and irrigation water, and fire-fighting systems.

The P-series pumps are vertical units consisting of a pump casing, a line shaft, a drive unit with a discharge head, and a support base. The drive unit's delivery port is normally located above the installation surface, but for special requirements it can also be created directly from the line shaft, below the installation surface. Let's take a closer look at how the various components are made and how they work.

Pump casing

The wet end is of the semi-axial type: it provides greater efficiency than the radial version, and is particularly suitable for handling high flow rates. The impellers are dynamically balanced with extreme precision, for vibration-free operation. The rotor is supported at the ends by large line bearings made from wear-resistant rubber, thus protecting the pump against the abrasive action of sand. The pump casing also features a foot valve; this keeps the line shaft full of water, ensuring optimal lubrication. The strainer at the end of the pump casing prevents foreign bodies from entering the suction port, thus protecting the entire vertical lineshaft unit.

Line shaft

This connects the pump casing to the drive unit, allowing the motion to be transmitted to the impellers, the pumped liquid to be conveyed, and the pump to be positioned at the desired depth. The line shaft consists of galvanised steel sections with flanged ends, and encloses the drive shaft. A coated bushing protects the shaft where it encounters the rubber support bearings, which are constantly lubricated by the pumped fluid.

Drive unit

Available in different versions, this consists of the discharge head, which forms the suspension base of the unit, as well as the rotating part's drive and support element. It serves to support the weight of the unit, to provide the connection to the delivery pipe, and to ensure the operation of the pump. All the drive units are equipped with anti-reverse devices, which are indispensable in automatically controlled installations to prevent the possibility of counter-rotating pump start-ups.

DRIVE UNIT
WITH ELECTRIC MOTOR

DRIVE UNIT WITH ELECTRIC MOTOR - “E” SERIES
This type of drive involves coupling the discharge heads to UNEL-IEC V1 design standardised electric motors. The pump shaft is coupled to the motor shaft by a flexible coupling. The drive unit is equipped with an anti-reverse device, and is fitted with an independent support with thrust bearings to support the rotating assembly. The bearings are angular-contact ball bearings, with grease lubrication for low and medium power drives, while oil-lubricated spherical roller bearings are used for the higher power drives.

BEVEL GEARBOX DRIVE UNIT - “R-RR” SERIES
The P-series vertical pumps can also be driven by a wide range of motors and engines (internal combustion engines, diesel engines, electric motors, etc.). This is made possible by the wide availability of gear ratios, the range of power ratings, and the availability of mixed drives (drives with double projection, drives with speed multipliers or reducers). The bevel gearbox series is sized with a high safety factor to ensure reliable operation, even under severe working conditions. All the gears are high-strength, and the lubrication of the gears and bearings is ensured by oil pressurised by a high-efficiency worm pump, and cooled by an extremely efficient cooling device.

DRIVE UNIT WITH BEVEL GEARBOX AND MULTIPLIER - “M-MR” SERIES
This design is derived from normal bevel gearboxes, with the application of a speed multiplier that can be connected to any PTO via a drive shaft. These drives’ flexibility of use is extended by the availability of the cylindrical double shaft projection version, with feather key on the transmission side, and a splined profile in accordance with DIN 9611 on the gearbox side. Optimised component contacts, lubrication, and cooling allow the noise levels to be kept down.

VERTICAL PULLEY DRIVE UNIT - “VG-VP” SERIES
This version with a grooved pulley for drive via standard V-belts, or with a flat pulley for flat belts, allows for easy coupling with internal combustion engines.
The simple design and efficient support and lubrication system guarantee reliability and safe operation, even under the critical conditions to which these installations are normally subjected. The characteristic power curve ensures that the motor is not overloaded. The NPSH value required is low due to the special hydraulic design.

DRIVE UNIT WITH BEVEL GEARBOX

Features that make the difference

The considerable depth
Water scarcity makes it necessary to diversify supply sources, including the exploitation of groundwater resources. The P-series pumps can be installed in wells, tanks, dry chamber, and pressurised tanks always with the pump casing immersed in the liquid. In the case of water to be pumped from deep wells, in their standard configurations they can reach water tables of up to 120 metres deep. Not only that, in specially designed configurations they can exceed 250 metres.

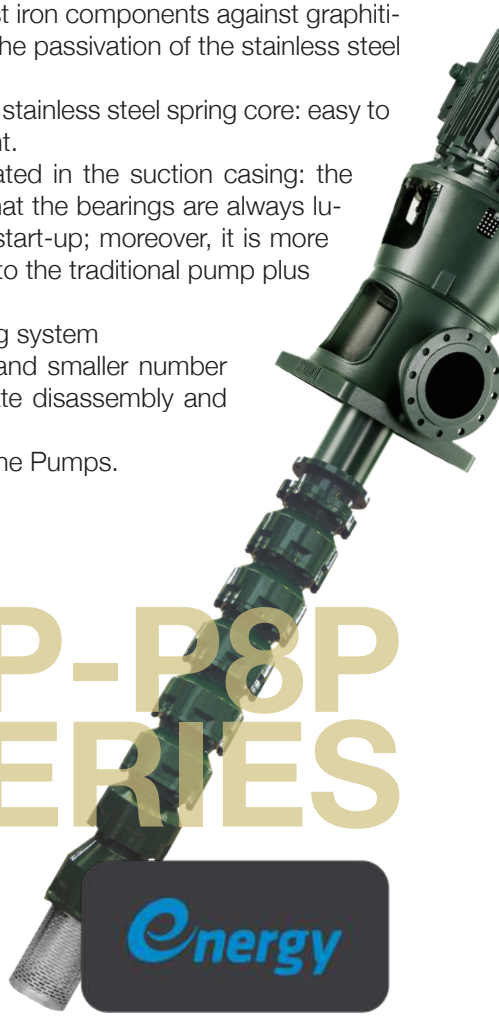
Usage flexibility
The P-series pumps lend themselves to the construction of pressurisation units consisting of multiple pumps connected in parallel. This makes it possible to split the total required flow rate with the possibility of the pumps operating in cascade based on the requirements, thus ensuring significant energy savings.
Considering the individual pumps, on the other hand, it should be noted that the head can be significantly modified by adjusting the diameter of the impellers or changing the number of stages.

Compact size
When pumps need to be installed inside engine rooms, the question of space is always extremely important. Thanks to their compact size, the P-series pumps ensure a high level of economy in construction work.

P6P-P8P Energy series: excellence in hydraulic performance

Created as an evolution of the E6P and E8P submersible pumps, the P6P and P8P vertical lineshaft units are part of the new Energy generation, providing excellent hydraulic performance. These pumps fully reflect Caprari's philosophy of developing products that combine reliability, performance, energy savings, and respect for the environment. Our idea of innovation is meeting the market's needs with cutting-edge products that improve the processes and contribute to the sustainability goals.
The P6P/P8P pumps are equipped with unique features, such as the patented Defender® device designed to prevent component corrosion, the integrated valve, and the spring-core bearings, which are also patented by Caprari.
The features and the different variants available make the P6P and P8P an extremely versatile product that's suitable for any application requirements and conditions of use.

Strengths of the series
• Top level efficiency ratings: the best available on the market to current date. The flatter performance curves ensure high efficiency over the entire working range.
• The excellent head per stage provides model selection advantages (shorter pump with the same head requirement).
• The high-quality casting technology guarantees high thicknesses for the massive components and the absence of discontinuity (typical of casting technology), and ensures low surface roughness, resulting in obvious performance advantages.
• The performance curves are always centred on the duty point thanks to specific impeller trimmings.
• The bearings are protected against the entrance of sand with the anti-recirculation lip. This distinctive feature sets these machines apart, and allows them to pump water with solid contents of up to 80g/m3.
• Ultra corrosion resistance. The strainer is fitted with Caprari's Internationally Patented DEFENDER® system. This system prevents corrosion caused by stray currents, seawater infiltration into groundwater, use in brackish water, etc. It protects the cast iron components against graphitisation, and promotes the passivation of the stainless steel components.
• Bearing with AISI316 stainless steel spring core: easy to remove for replacement.
• Conical valve integrated in the suction casing: the check valve ensures that the bearings are always lubricated, even during start-up; moreover, it is more compact with respect to the traditional pump plus foot valve solution.
• O-ring diffuser sealing system
• Appropriately sized and smaller number of stud bolts to facilitate disassembly and maintenance
Vertical Lineshaft Turbine Pumps.



Sources
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