Dreamarks

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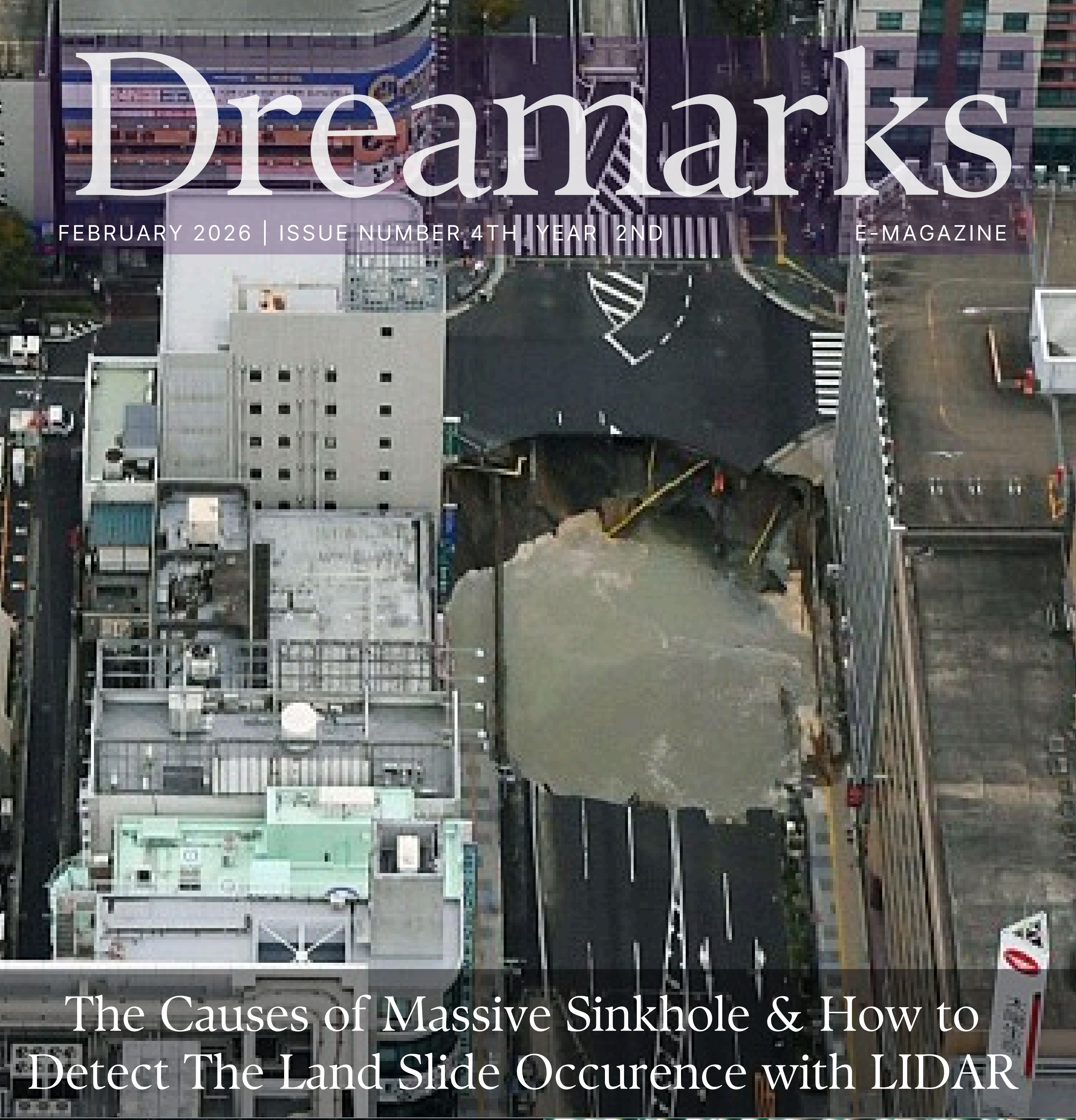
E-MAGAZINE



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About Dreamarks

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Rainbow at The Deepest Sediment

While writing this, my little daughter was talking to me that Dreamarks is hard to made. Then i have to explain to her about the reason behind Dreamarks. First this is as an effort in setting of the Beacon of Hope and Dreams. Beacon means that as information that is regularly given to notify the sea explorer that the land is near and they should not cross the boundaries of beaches so their ship will not sunk.
I was explaining that when the time comes, she and her sister will be able to compose Dreamarks more easier and sooner than their Bunda.

Speaking of the Ocean, in the middle of 2024, scientist has discovered The Dark Oxygen that are found in the abyss of the deepest Ocean Floor. This means that, by mimicking the chemical reactions and the stone minerals structures Stones in Ocean Floor, a model of dark oxygen synthesizing can also be found, many more lifes can be saved, many ailments can be cured, many aerob creatures can be made to sustain their life in a place without sunrays, and the space travel can be push further because of the furthest travels possibilities now becoming endless.

The pertaining of life sustenance can be more rich and abundant if we did not rely our effort of oxygen synthesizing and the growth of vegetations and cattles only with the help of Sunrays. Just as we had made diamonds from carbon in the sands, and creating oil drops from plastics trashes. The possibility of places for living can also be endless and humankind can traverse their journey further and sooner.

Gina Al Ilmi

Editor-in-Chief

DARK OXYGEN

How To Massively Synthesized

WHO website on March 2024, quote that Global access to oxygen and options to deliver respiratory support are limited, and patient needs in low- and middle-income countries (LMICs) are unmet. WHO Findings :

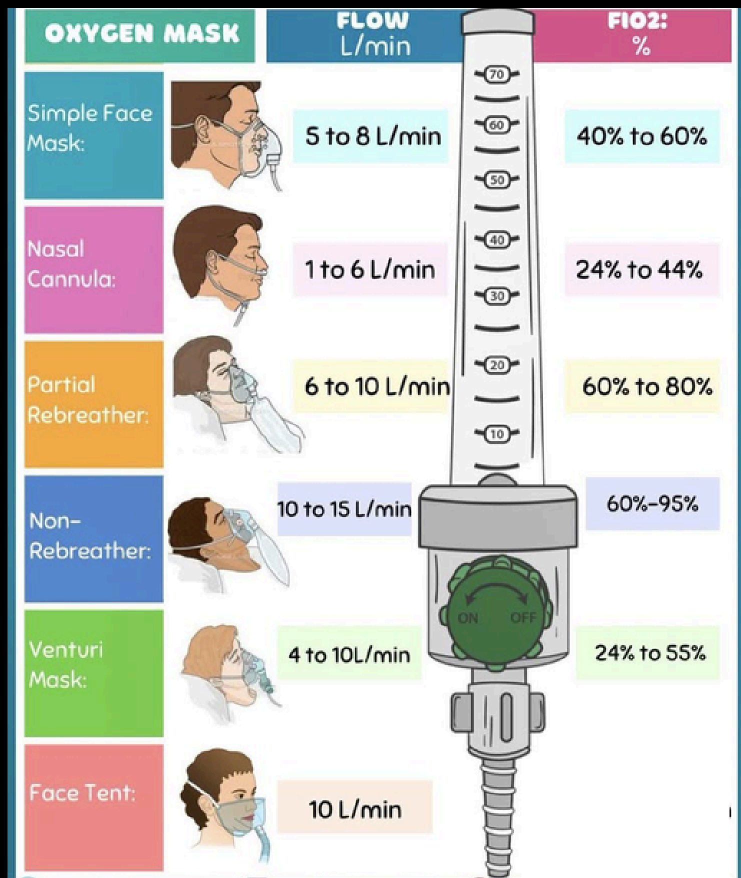
- 23% mortality from acute respiratory infection requiring oxygen (with regional variations of 10–38%)
- Oxygen and oxygen delivery devices are severely limited (non-invasive advanced respiratory support 1–3% patient beds and ventilators 2–25%, depending on region)

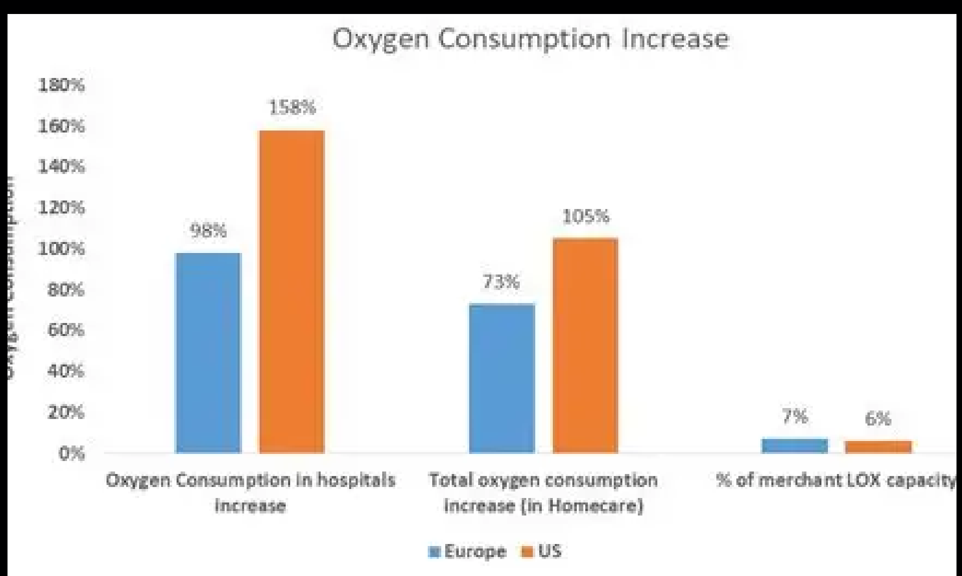
The Immense Global Demand for
SYNTHESIZED OXYGEN

To synthesize oxygen for a thousand people, one would need to estimate the total oxygen consumption and production. The average human breathes about 7 to 8 liters of air per minute, which translates to approximately 11,000 liters per day. This amount of air would require a significant amount of oxygen to be produced, considering that the atmosphere contains about 21% oxygen.

To synthesize oxygen for a thousand people, one would need to consider the following:

- Oxygen consumption: Approximately 11,000 liters of air per day.
- Oxygen production: The amount of oxygen produced by a single tree, which is about 92 liters per day.
- Oxygen supply: The total oxygen supply needed for a thousand people, which would be significantly higher than the production from a single tree.
- Given the vast difference between oxygen consumption and production, it is essential to consider the natural processes of photosynthesis and the industrial methods of oxygen production to ensure a sustainable supply of oxygen for a large population.





Global Oxygen Market, 2025

The Oxygen Market size was valued at USD 32.42 Billion in 2024 and the total Oxygen revenue is expected to grow at a CAGR of 12.8% from 2025 to 2032, reaching nearly USD 84.99 Billion.

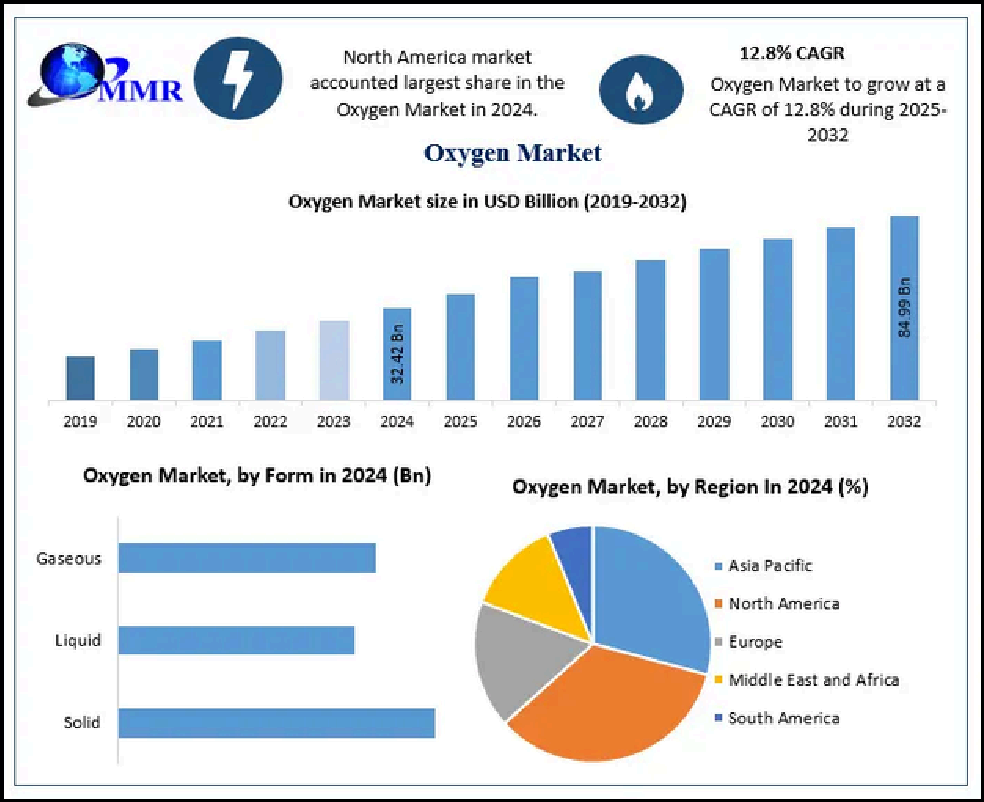
In nature, the plants during the process of photosynthesis produce oxygen. The oxygen is taped from the air by liquefaction followed by the separation of other gases and then by distillation. The oxygen is called industrial oxygen, which has 90 to 95% purity. It is also used in furnaces in the manufacture of steel and, the burning of explosives in mines. It is mostly used for medical purposes i.e. for artificial respiration purposes in hospitals, high altitude climbing, airplanes, jet leans, etc.

Medical Oxygen Demand

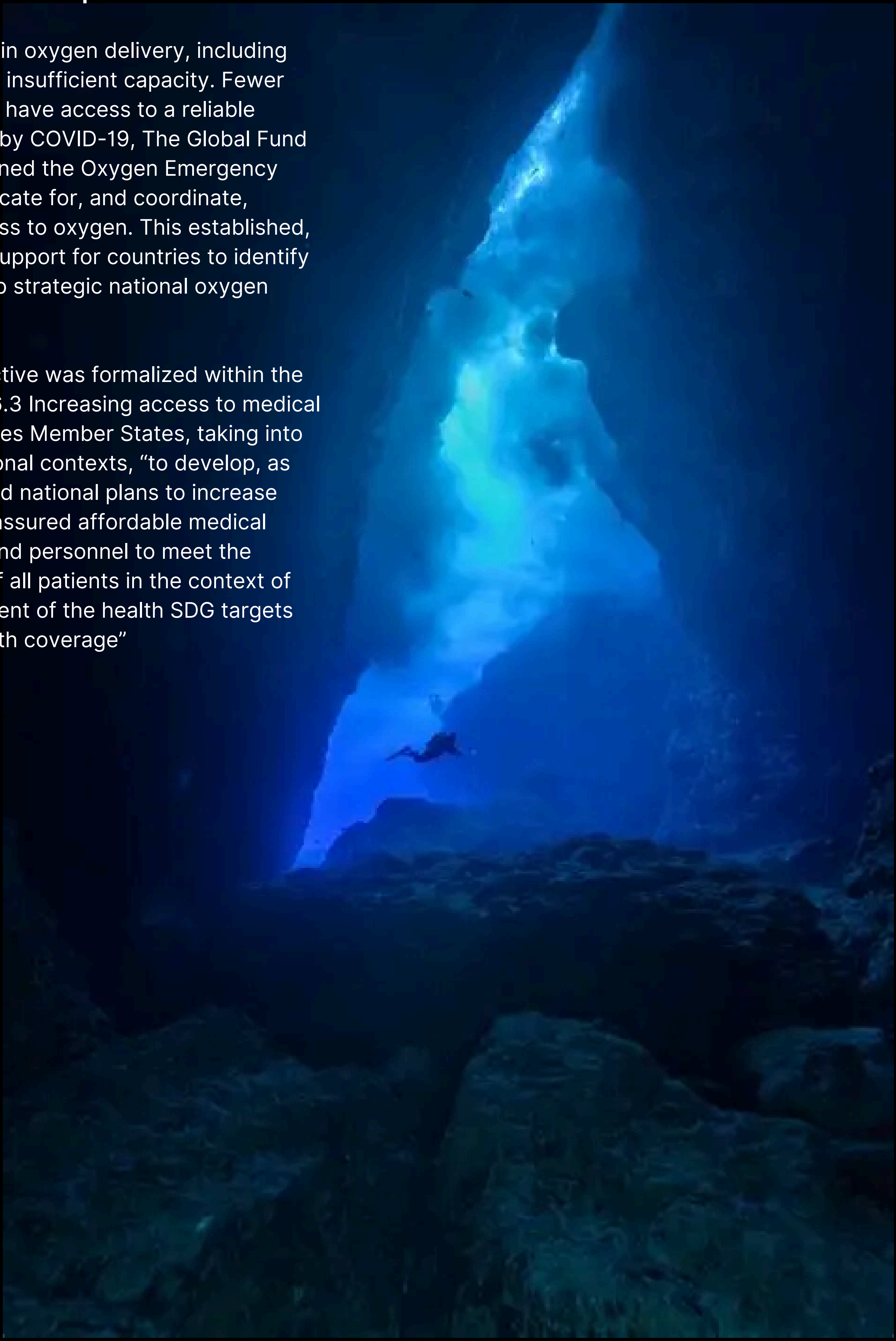
Medical oxygen is a life-saving essential medicine with no substitute. It is required by many patients across emergency, critical care and operative areas of hospitals, and by some at home.

A very broad range of conditions can cause low blood oxygen (hypoxaemia), including communicable and noncommunicable diseases and trauma. These may affect people at any time during the life course, including those who are particularly vulnerable (newborns, children, pregnant people and older adults).

Health systems must therefore be capable of delivering oxygen in many environments in order to save lives from diseases such as pneumonia, COVID-19, tuberculosis, chronic obstructive pulmonary disease, tuberculosis, cancer, cardiovascular- and malaria-related conditions, and those requiring surgery.



Global Oxygen Critical Gaps



Critical gaps exist in oxygen delivery, including patchy supply and insufficient capacity. Fewer than half of LMICs have access to a reliable supply. Prompted by COVID-19, The Global Fund and Unitaid convened the Oxygen Emergency Taskforce to advocate for, and coordinate, expansion of access to oxygen. This established, as a key priority, support for countries to identify needs and develop strategic national oxygen scale-up plans.

In 2023, this objective was formalized within the WHA resolution 76.3 Increasing access to medical oxygen, which urges Member States, taking into account their national contexts, “to develop, as appropriate, costed national plans to increase access to quality assured affordable medical oxygen systems and personnel to meet the identified needs of all patients in the context of national achievement of the health SDG targets and universal health coverage”

Medical Oxygen Demands

Medical oxygen needs Summarize the need for medical oxygen from:

- The burden of hypoxaemic disease, its determinants and causes and outcome trends.
- Specific health interventions that rely on medical oxygen, such as surgery and anaesthesia.
- Historic or current surge need resulting from outbreaks or pandemics.

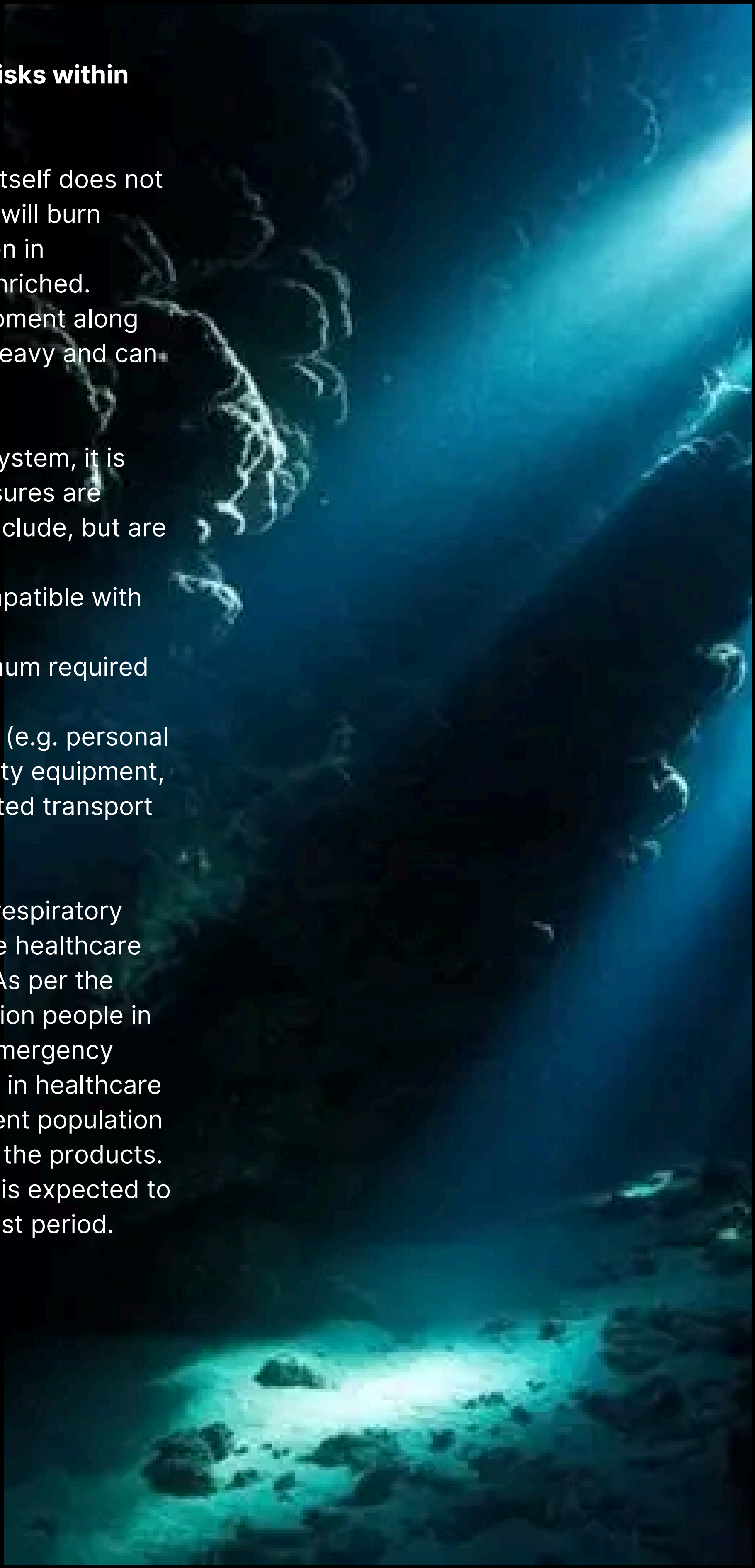
Provide the appropriate level of health care and disaggregation by ward/hospital bed type (e.g. intensive care unit, emergency room, neonatal intensive care unit, operating room, labour) and by demographics (e.g. age, sex, location, ethnicity, socioeconomic status and disability), where possible.

Oxygen Sectoral Strategies & Plans

Linkages to other oxygen-relevant sectoral strategies and plans Ensure alignment and integration with other oxygen-related sectoral strategies and plans. Recognize the role of oxygen in emergency preparedness and response. Where relevant, consider referring to the following national assessments and plans:

- Health programmes (emergency, critical and operative care, noncommunicable diseases, maternal and child health, tuberculosis, newborn health etc.).
- Health priorities (One Health, SDGs, UHC, NAPHS and the JEE of International Health Regulation capacities, and strengthening HEPR).
- Strategies and plans outside of the health sector, including but not limited to infrastructure (to and for health systems), utilities (electricity, water), transportation and logistics.

Apply measures to counter safety risks within Industrial Oxygen Ecosystems

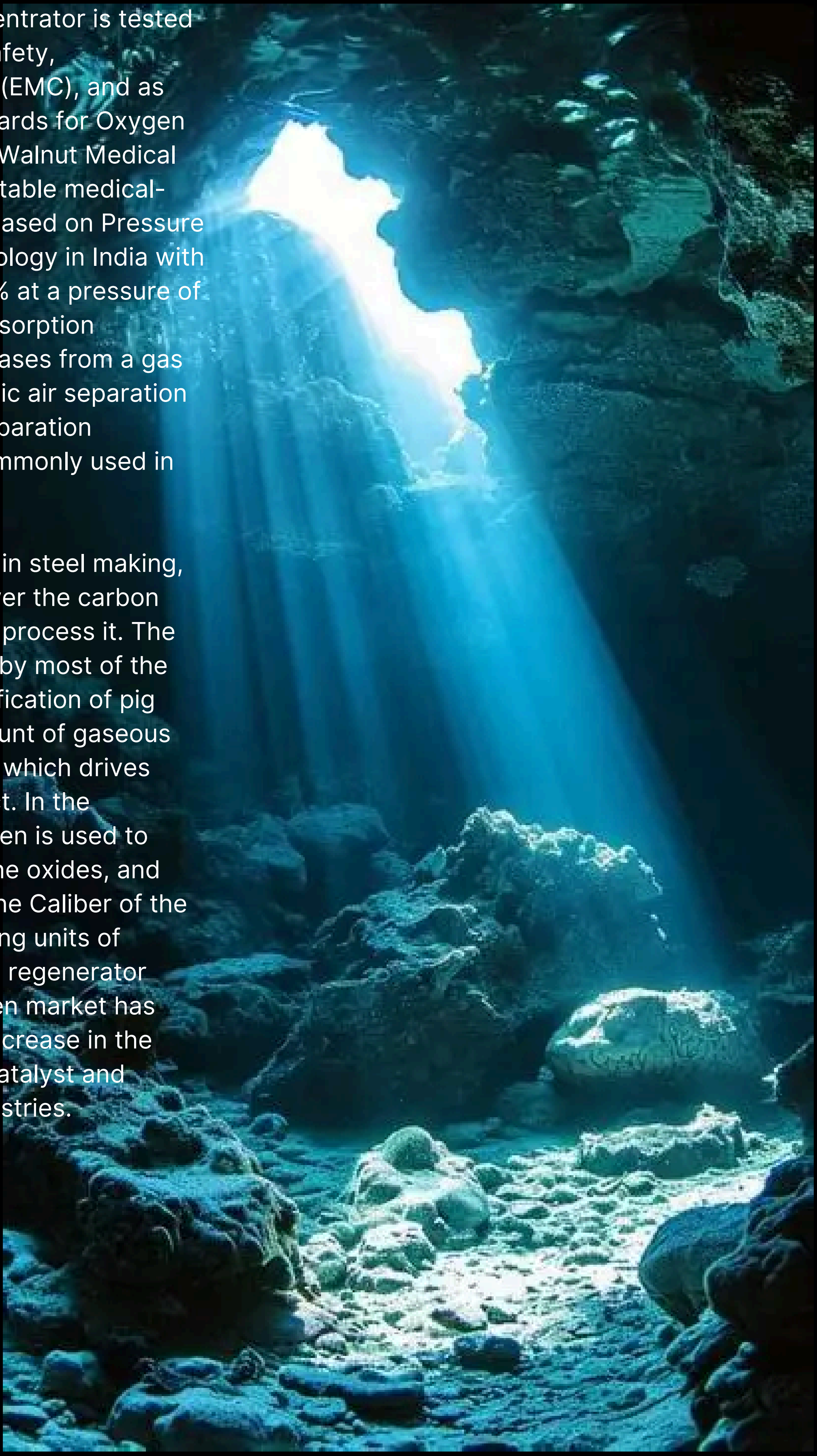


As an oxidizing agent, while oxygen itself does not burn, it facilitates combustion – fires will burn faster, hotter and more violently, even in environments that are only slightly enriched. Another major risk is that some equipment along the medical oxygen supply chain is heavy and can cause physical harm.

For these and other risks in the ecosystem, it is important to ensure that safety measures are implemented and practised. These include, but are not limited to:

- The use of materials which are compatible with oxygen-rich environments.
- Using medical oxygen within maximum required pressure ranges.
- The application of safety measures (e.g. personal protective equipment [PPE], fire safety equipment, chain restraints for cylinders, dedicated transport for oxygen).

The increasing incidence of chronic respiratory diseases and rising demand for home healthcare are the major drivers of the market. As per the MMR analysis, COPD affects 11.7 million people in America. It accounts for millions of emergency department visits and tens of billions in healthcare costs each year. The increasing patient population is expected to boost the demand for the products. The consequent increase in demand is expected to drive the industry through the forecast period.



Walnut Medical Oxygen Concentrator is tested for patient safety, electrical safety, electromagnetic compatibility (EMC), and as per International Safety Standards for Oxygen Concentrators. Mohali-based Walnut Medical has developed 5L and 10L portable medical-grade oxygen concentrators based on Pressure swing adsorption (PSA) technology in India with an oxygen purity of above 96% at a pressure of 55-75 Kpa. Pressure swing absorption technology separates single gases from a gas mixture. PSA is a non-cryogenic air separation (near ambient temperature separation processes) process that is commonly used in commercial practice.

Oxygen is a major component in steel making, wherein the gas is used to lower the carbon content of iron ores to further process it. The basic oxygen process is used by most of the steel industry for the first purification of pig iron. They require a large amount of gaseous O2 for running blast furnaces, which drives overall demand for the product. In the pharmaceutical industry, oxygen is used to create synthesis gas, propylene oxides, and ethylene oxides. To improve the Caliber of the air input in the catalytic cracking units of refineries, oxygen is used as a regenerator catalyst. The worldwide oxygen market has progressed as a result of an increase in the consumption of oxygen as a catalyst and oxidizing agent in various industries.

The Discovery of Dark Oxygen

Recent discoveries reveal that metallic nodules on the deep-sea floor produce "dark oxygen," challenging previous beliefs that oxygen is solely generated through photosynthesis.

Discovery of Dark Oxygen
Researchers have found that polymetallic nodules located on the ocean floor, particularly in the Clarion-Clipperton Zone of the Pacific Ocean, can produce oxygen in complete darkness, at depths of around 13,000 feet. This phenomenon, termed dark oxygen, was first identified in 2013 but gained significant attention following a study published in July 2024 that confirmed its existence.

Mechanism of Production
The production of dark oxygen is believed to occur through a process similar to electrolysis, where the metallic nodules act like natural batteries. They generate an electric current that splits seawater into hydrogen and oxygen, even in the absence of sunlight. This challenges the long-held assumption that only photosynthetic organisms, such as plants and algae, contribute to Earth's oxygen supply.

Ecological Significance
The discovery of dark oxygen has profound implications for deep-sea ecosystems. It suggests that there is an alternative source of oxygen that supports various marine life forms, including microbes and larger organisms, in the dark depths of the ocean. This oxygen production could be crucial for the survival of benthic organisms that rely on it for respiration._

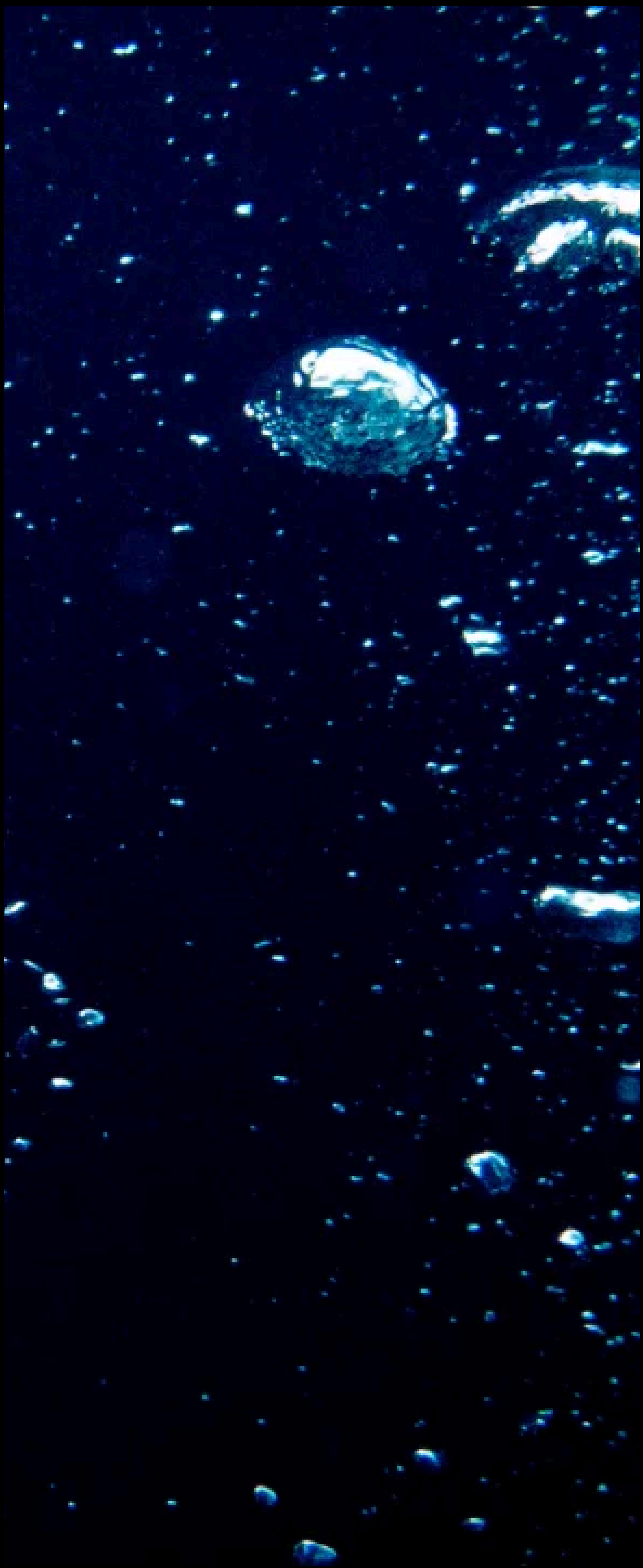
Implications for Deep-Sea Mining

The findings raise concerns about the potential impact of deep-sea mining on these oxygen-producing nodules. Mining activities could disrupt these vital processes, leading to unknown ecological consequences. Researchers are advocating for precautionary measures and stricter regulations to protect these newly discovered oxygen sources and the delicate ecosystems they support.

Ongoing Research

To further investigate dark oxygen, scientists are planning expeditions to deploy advanced deep-sea landers capable of withstanding extreme pressures. These landers will help measure seafloor respiration and gather more data on how these nodules produce oxygen.

In summary, the discovery of dark oxygen in the deep sea not only challenges existing scientific paradigms but also highlights the need for sustainable practices in deep-sea mining to protect these critical oxygen sources and the ecosystems they support.



THE ORIGIN OF MEGA SINKHOLE

The Depression of The Ground Lacking Underground Water

Typically, sinkholes form so slowly that little change is noticeable, but they can form suddenly when a collapse occurs. Such a collapse can have a dramatic effect if it occurs in an urban setting.

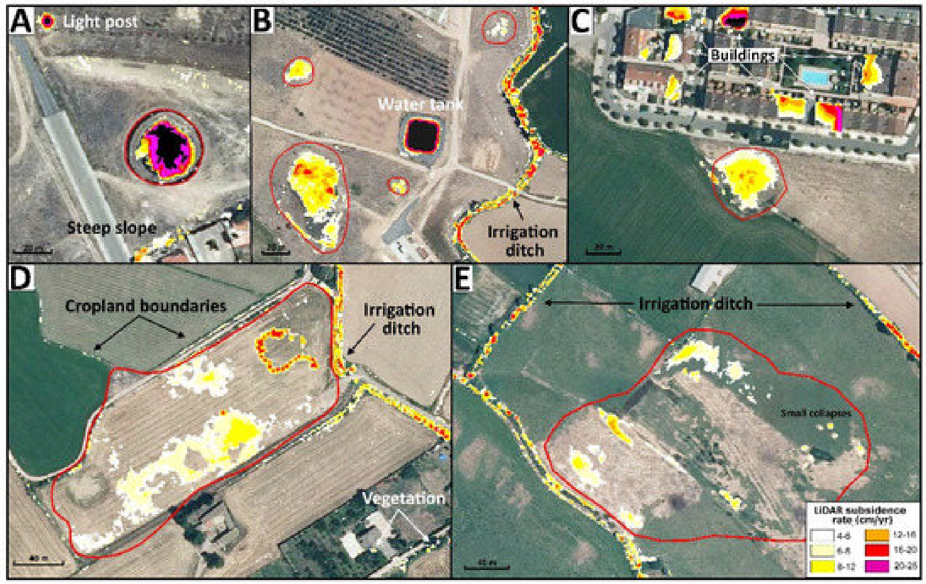
Sinkhole Colapses Appearance Needing Underground Mapping Regular Measurement

A sinkhole is a depression or hole in the ground caused by the dissolution of surface rock, often limestone, by water. They can vary in size from a few feet to hundreds of acres and can be quite deep, sometimes exceeding 100 feet. Notable examples include the Zacatón cenote in Mexico, which is the world's deepest water-filled sinkhole, and the Boesmansgat sinkhole in South Africa. Sinkholes are a fundamental feature of karst topography, where the underlying bedrock is eroded by groundwater.

Sinkhole Detection and Characterization Using LiDAR-Derived DEM

LiDAR-derived digital elevation model (DEM) data has been utilized to detect and characterize sinkholes with high precision. This method allows for the probabilistic detection of sinkholes, particularly in rural or inaccessible areas, and can automatically delineate sinkhole boundaries. The geometric characteristics of identified sinkholes, such as depth, length, area, and volume, can also be quantified using this data. The effectiveness of LiDAR in this context has been demonstrated by studies that have shown a high reliability in predicting reported sinkhole boundaries and computing their geometric characteristics.

THE LOW VELOCITY OF THE SINKHOLE FORMATION ENABLE US TO DETECTING GROUND COLLAPSE

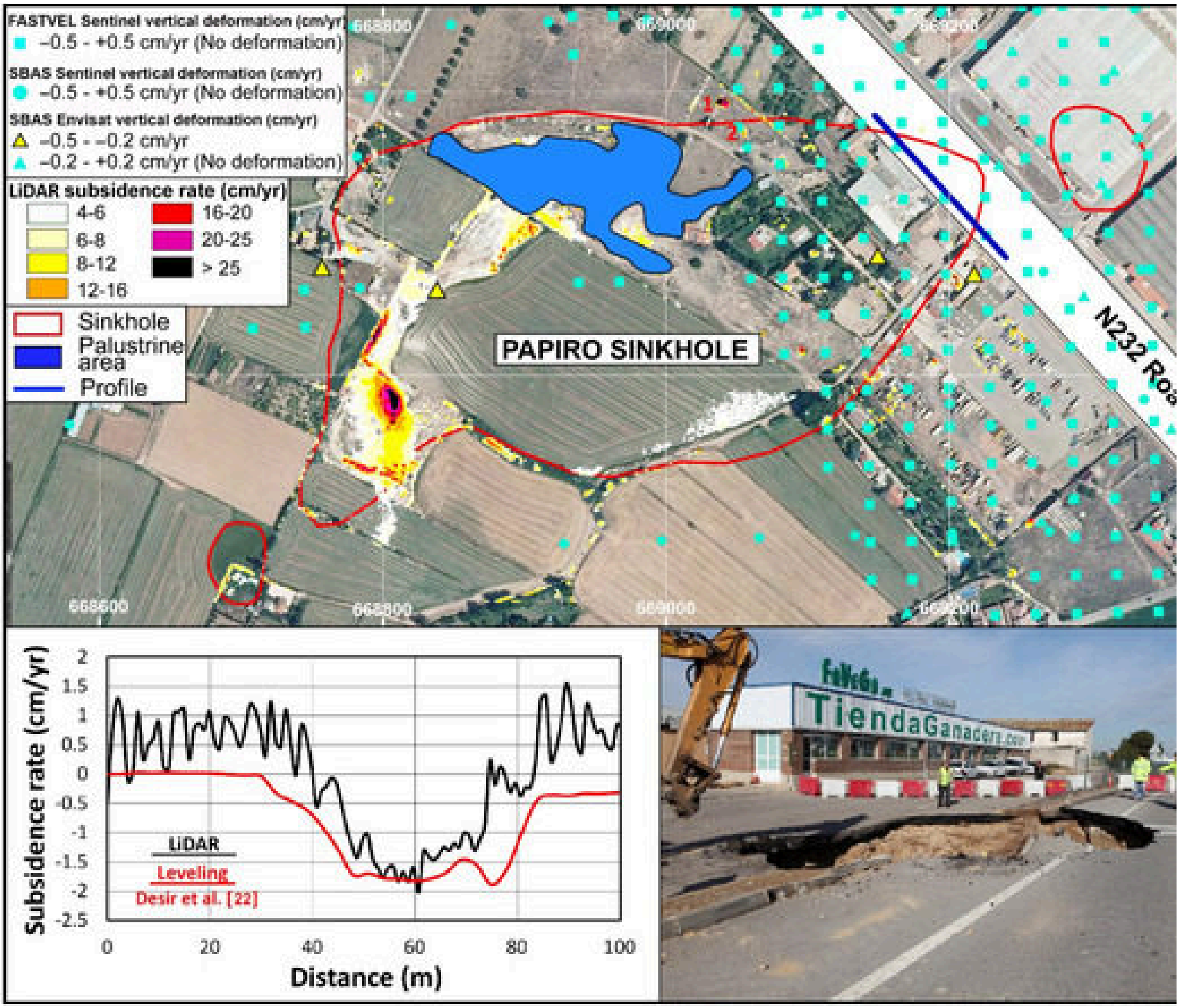


Airborne LIDAR & Satellite Image Projections Algorithms

Nowadays, Jesus Guerrero, et al (2021) through his research in mdpi.com found that the mapping process as well as the accuracy and completeness of the sinkhole inventories can be substantially improved using airborne LiDAR (Light Detection and Ranging) data. An important advantage of this remote-sensing technique includes the possibility of filtering the vegetation to produce accurate and high-resolution bare-ground digital elevation models (DEMs).

These models can be used to:
(a) generate 3D representations of the terrain (e.g., hillshades, red relief image maps) that facilitate the delineation of the sinkholes
(b) extract automatically morphometric parameters
(c) apply automated routines for the extraction of closed depressions.
Recent processing algorithms and filters favor the automated detection and morphometric characterization of sinkholes, significantly improving the speed and the efficiency of the sinkhole mapping process using LiDAR datasets.
Nevertheless, the automatic mapping of sinkholes suffers from significant limitations, including a substantial number of false positives that need to be separated, commonly using morphometric data, and the underestimation of the size of the karst depressions.

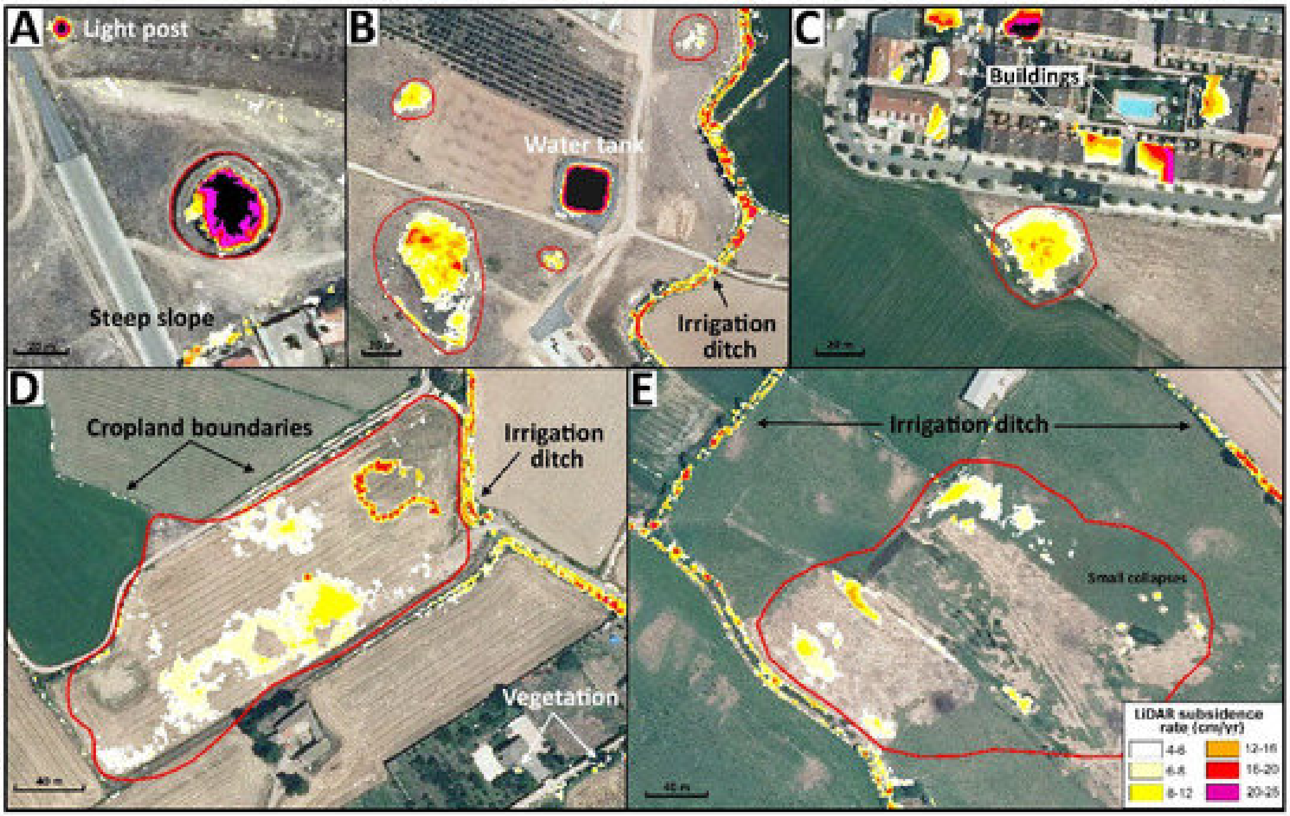
However, sinkhole hazard assessment requires not only spatial data, but also a temporal analysis of the sinkholes for subsidence prediction, including information on their activity and spatial-temporal probability of occurrence. The performance of airborne LiDAR to detect ground deformation associated with sinkholes has barely received attention, and limited work has been done to explore its practicality, in contrast with other subsidence monitoring techniques such as GNSS, high-precision leveling, DInSAR, GB-InSAR, terrestrial laser scanning, or close-range photogrammetry. However, models derived from the comparison of multi-temporal LiDAR data have already been satisfactorily used to quantify changes in the coastline and coastal landforms, glaciers, active faults, volcanoes, landslides and land subsidence due to water withdrawal.



In his study, Jesus Guerrero (2021) found that the sinkhole inventory covers an area of 135 km^2 in the middle reach of the Ebro River valley in Zaragoza city and its surroundings (study area). The work also explores two sinkholes in the lower stretch of the Gállego River valley (Zuera sinkholes site), NE Spain.

From the geological perspective, the studied zones are situated in the central sector of the Ebro Cenozoic basin, with subhorizontally lying salt-bearing evaporites (gypsum, anhydrite, halite and glauberite) of the late Oligocene-Miocene Zaragoza Formation. The soluble bedrock is mainly covered by gravelly terrace deposits, locally thickened by synsedimentary dissolution-induced subsidence and reaching more than 60 m thick.

Multiple lines of evidence, including borehole data, paleosubsidence structures affecting both the alluvial cover and the bedrock, hydrochemical data, geomorphic evidence including kilometer-scale enclosed basins, and subsidence rates indicate that subsidence in the Ebro and Gállego valleys is largely related to the interstratal dissolution of halite and glauberite beds interbedded within the evaporitic bedrock. In the Zuera sinkholes, a 60 m deep borehole penetrated gravel-filled voids at 17 m depth and halite layers starting from a depth of 42 m. In the surroundings of Zaragoza city, the altitudinal correlation between groups of thickened terraces and the distribution of glauberite and halite units indicate that the subsidence phenomenon has been induced by dissolution of those salt layers.

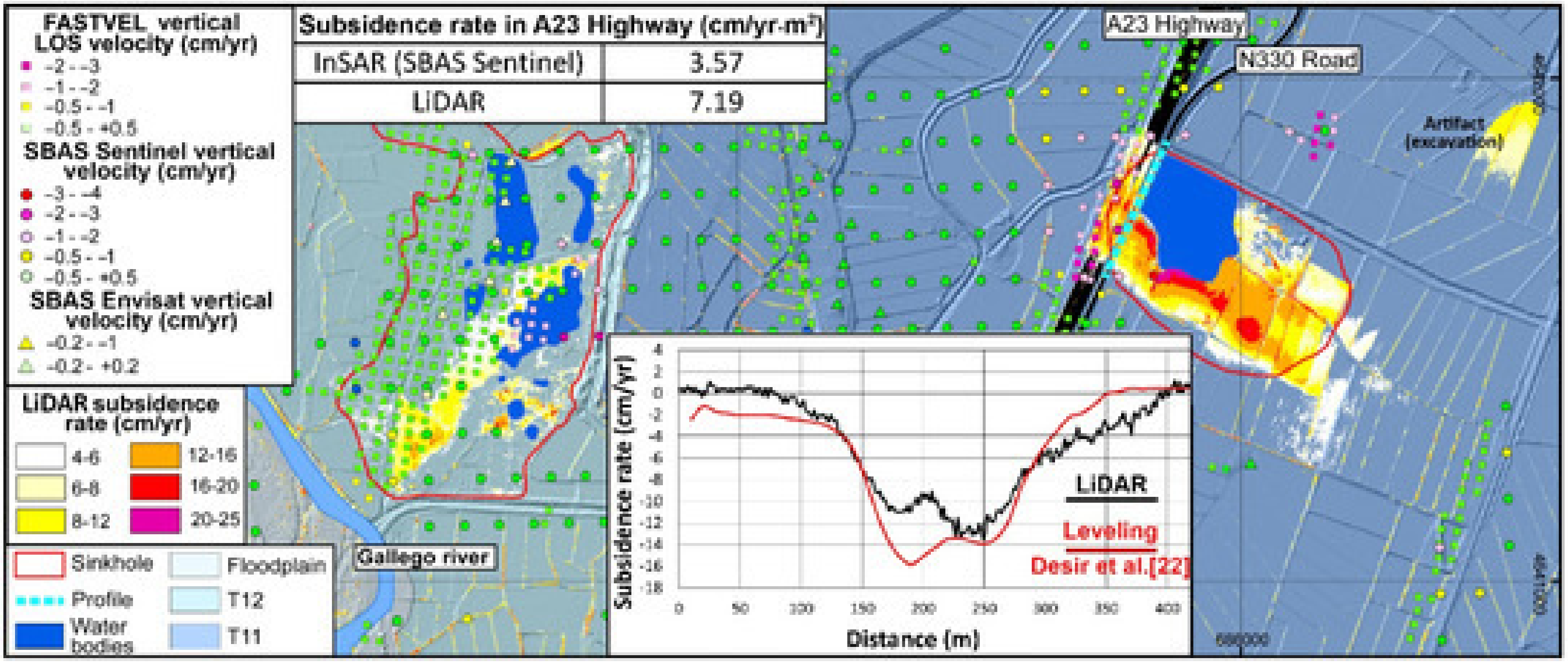


The analyzed sinkholes are typically hundreds of meters in diameter and are dominated by sagging subsidence (i.e., cover and bedrock sagging sinkholes or cover sagging sinkholes). The active depressions typically display continuous and relatively rapid subsidence related to the high solubility of the evaporite bedrock.

Eventually, these large sinkholes can be locally affected by the occurrence of nested catastrophic collapses with high damaging potential. Most of the subsidence damage in the area is related to old sinkholes recognizable in old aerial photographs and historical topographic maps that were filled by man-made deposits and occupied by human structures.

The subsidence rates at some of the most active sinkholes were gathered by low-precision leveling profiles, cumulative displacement measured in deformed man-made structures of known age, retrodeformation analysis of trench logs together with geochronological data and historical information, high-precision leveling profiles, and multi-temporal terrestrial laser scanner data.

In addition, the irrigation of crop fields provides a substantial extra water input to the alluvial-evaporite aquifer system enhancing karstification and subsidence processes. The result of the high risk of sinkhole hazards in combination with poor preventive planning is that numerous buildings have been demolished and many transportation infrastructures need continuous remediation works.



LiDAR data help us to change the category of 14 sinkholes previously classified as potentially inactive and recognize 5 possible new subsidence areas that were not included in the sinkhole inventory.

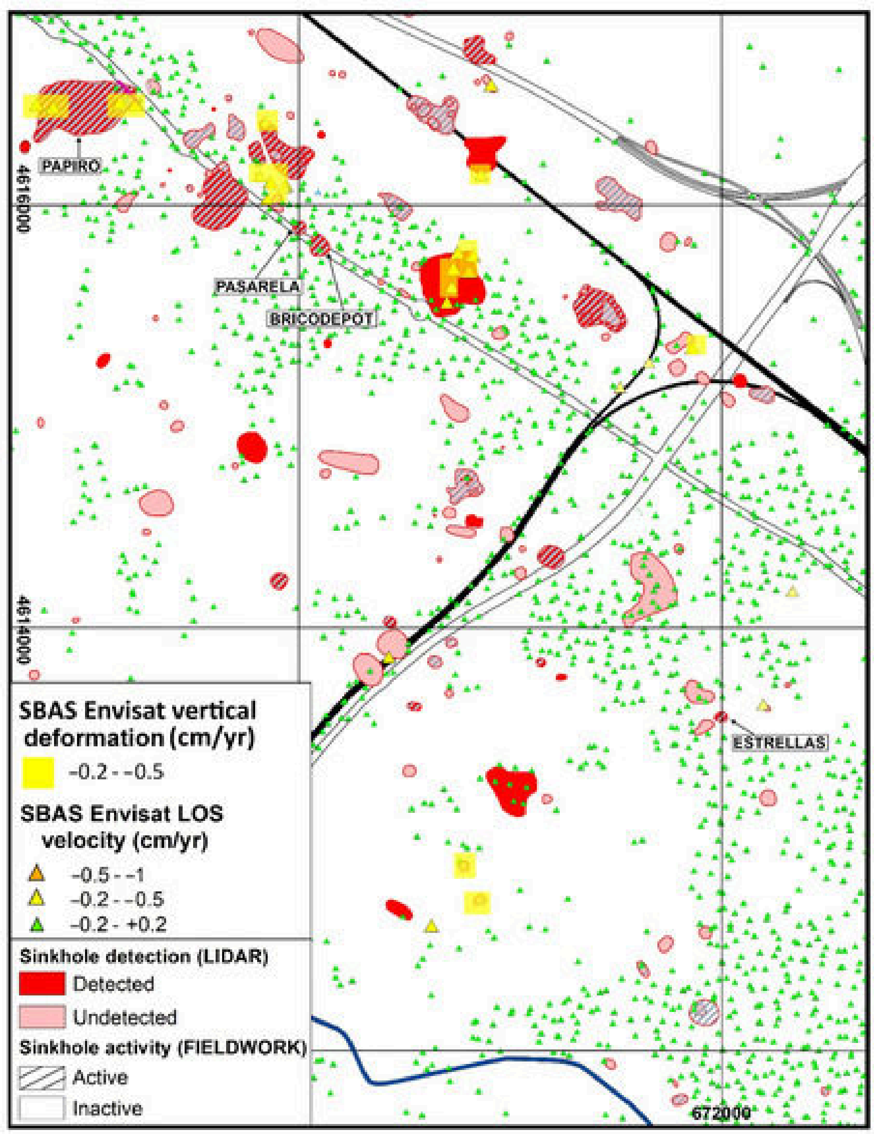
Subsequent field checking revealed that two out of the five potential sinkholes correspond to true dissolution-induced subsidence depressions, one remains uncertain due to lack of accessibility, and the remaining two are plots of land subject to elevation changes related to human alterations.

The addition of detected active sinkholes by conventional mapping plus differential LiDAR equals 54 out of 145 sinkholes (37% of the sinkhole inventory). If we consider the total number of active sinkholes (conventional mapping plus differential LiDAR), the success rate of the DoD reaches 68%. These values reveal that:
(a) LiDAR allows for the identification of sinkholes with subsidence rates over −4 cm/yr,
(b) the combination of conventional mapping and LiDAR data allows one to expand the number of sinkholes classifiable as active, and
(c) almost half of the sinkhole population shows signs of ongoing subsidence.

Spatial distribution of active sinkholes in the detailed area framed in Figure 1 according to LiDAR data and the SBAS Sentinel LOS velocity and vertical deformation maps, and location of the investigated sinkholes with known subsidence rates.

The filtered dense point clouds of the LiDAR data unfortunately show a large number of artifacts that may be misinterpreted as small collapses and require a time-spending validation.

However, it successfully identifies most of the active, fast-moving sagging sinkholes and compound depressions. Overall, it allows for the identification of 21 out of the 38 previously mapped active sinkholes of any type (sagging, collapse, or a combination of both) and size (small collapses to very large depressions), which represents a success rate of 57%. The undetected ones may correspond to slow-moving sinkholes with subsidence rates under the threshold limit (−4 cm/yr) and/or sinkholes that have experienced artificial changes between the first and second LiDAR flight.

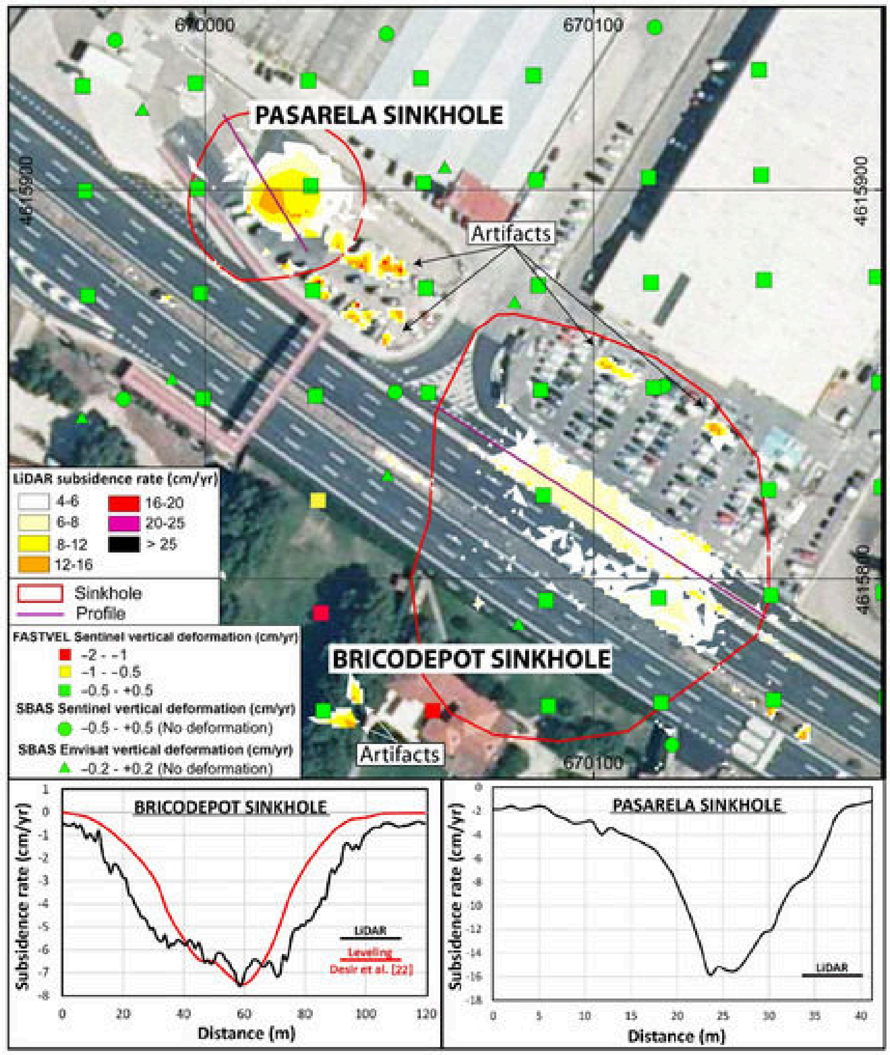


The InSAR maps generated with the SBAS Envisat, SBAS Sentinel and FASTVEL Sentinel algorithms only provide subsidence data for 6, 11 and 17 active sinkholes that represent 4, 7 and 12% of all the sinkhole inventory, respectively.

Considering the totality of active sinkholes (conventional mapping plus LiDAR), the higher spatial resolution of FASTVEL maps showed the better performance, with a success rate of around 30%, although it was less efficient than LiDAR and conventional mapping alone.

The lower performance can be attributed to the low InSAR data point coverage in cultivated lands, the small size of many sinkholes and the low spatial resolution of the InSAR maps.

In fact, all the sinkholes detected by InSAR correspond to very large compound sinkholes located in urbanized areas or along infrastructures rather than in agricultural terrains, due to the signal decorrelation in vegetated and non-developed environments.



In the Pasarela sinkhole, surface settlement seems to be concentrated in the parking lot and shows a concentric displacement pattern increasing towards the center. In contrast, in the Bricopedot sinkhole, the displacement model indicates subsidence mainly along the NE service road, where re-asphalting is carried out with a much lower frequency than that along the main carriageways.

The subsidence-rate profiles generated from the displacement models provide maximum subsidence rates of −15 and −7.5 cm/yr for the Pasarela and Bricodepot sinkholes, which are coherent with the already published precise leveling and TLS data. The subsidence-rate profile of the Bricodepot sinkhole shows higher subsidence rates along most of the profile than those obtained by high-precision leveling, suggesting a probable systematic error in the elevation data of the filtered LiDAR data.

Unfortunately, the LiDAR data only detects ground deformation around the central sector of the sinkholes affected by higher subsidence. However, field mapping, leveling data, and TLS deformation maps indicate that subsidence extends towards the sinkhole edges, although at progressively lower rates. This important limitation is related to the detection limit of −4 cm/yr established for the LiDAR data due to vertical precision limitations. Artifacts are associated with vehicles and dense vegetation and appear as small patches distinguishable from the consistent deformation patterns of the sinkholes. Once again, the SBAS Envisat, and SBAS and FASTVEL Sentinel processing approaches were not able to identify ground deformation in any of the sinkholes. However, the FASTVEL map depicted three deformation points outside the southwestern boundary of the Bricodepot sinkhole that might be related to incipient subsidence and sinkhole growing direction.

How to Renovate The Sinkhole After Massive Land Slide

The massive cave-in appeared in the city's bustling Hakata district, a major business and entertainment centre, with muddy underground water flowing into the hole.

After Massive Land Slide causes a Mega Sinkhole in the Fukuoka city, Kyushu Island. Hundred of workers dumped huge amounts of wet cement and sand into the huge hole and fixing electricity, gas and water lines. Construction teams in Fukuoka worked around the clock, dumping huge amounts of wet cement and sand into the huge hole and fixing electricity, gas and water lines.

It is thought the road collapsed because subway construction exposed support columns of nearby buildings. The city's mayor, Soichiro Takashima, said in a statement: 'We're very sorry for causing great trouble.

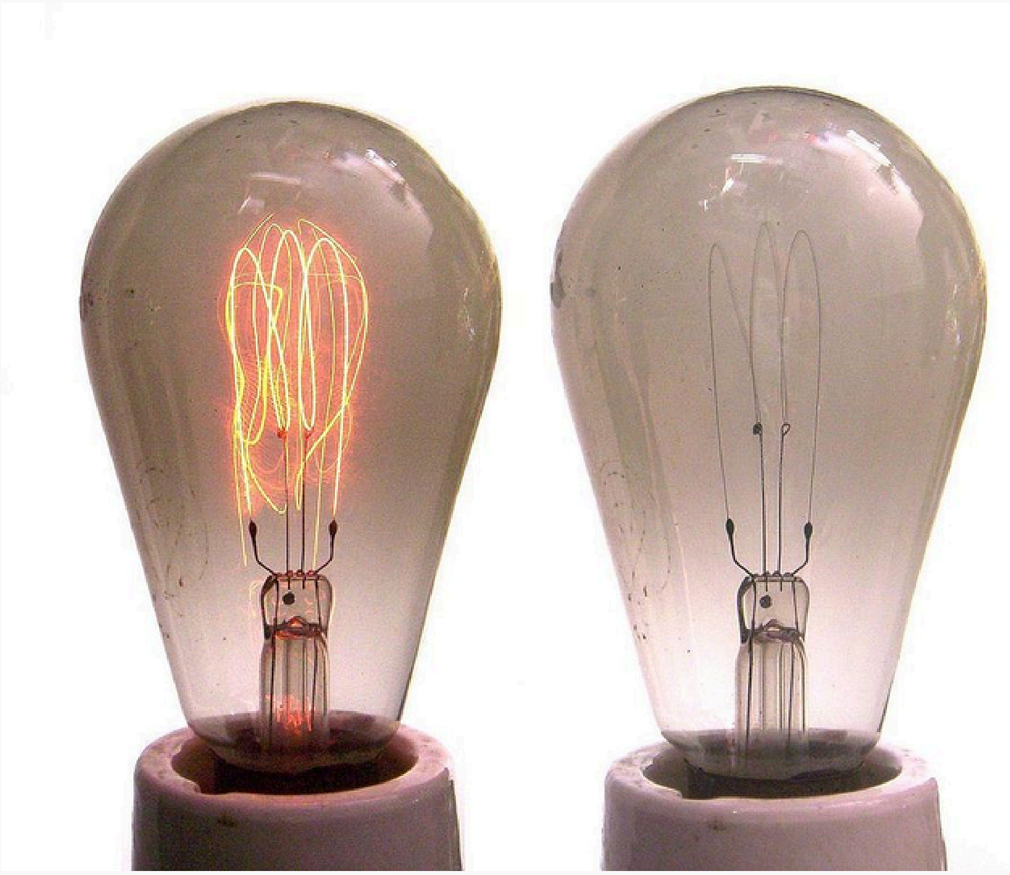
Gradually the hole is filled up before the road surface is relaid and the road reopened. The road reopened in just a week after a huge repair operation which saw teams operating around the clock. The sinkhole is believed to be about 40 feet wide and 25-30 feet deep. Gradually the Fukuoka workers managed to set their priorities and the sinkhole is filled up before the road surface is relaid and the road reopened within a week since the landslide occurence.

Edison began experimenting with incandescent light bulbs in 1878. Incandescent lamps produce light by using electricity to heat a thin strip of material, called a filament, until it gets hot enough to glow. Many inventors had tried to perfect the incandescent lamp but the bulbs they built had extremely short lives. Others were expensive to make which made them impossible to apply on a large scale commercially. Still others drew large amounts of current that required excessively thick wires that again raised costs. Finding a good material for the filament was one major problem that Edison eventually overcame.

Edison realized that in order to keep current flow down he has to find a material that has high resistance. In order to prolong the life of the filament, the material should also be durable to heat. After testing thousands of materials, ranging from platinum to beard hair, Edison discovered that a filament made of carbon has the properties he was looking for. Edison decided to try a carbonized cotton thread filament. That bulb glowed for a record fourteen hours. Edison immediately applied for a patent, where he described that the carbon filament could be made from various materials such as “cotton and linen thread, wood splints, papers coiled in various ways”.

Edison continued to experiment with different organic materials which he carbonized in his laboratory. He contacted biologists and had them send different plant fibers from the tropics. He sent his workers to different places around the globe looking for the perfect material. Edison estimated that he “tested no fewer than 6,000 vegetable growths, and ransacked the world for the most suitable filament material.” Until Edison Found Bamboo filaments and succeeded in creating his lamp inventions.

BAMBOO FILAMENT ELECTRICAL CAPABILITIES



As Alternate for Metal Composites

Bamboo filament composites are sustainable, biodegradable materials combining bamboo fibers with polymers, offering wood-like aesthetics, enhanced strength, and environmental advantages for 3D printing, additive manufacturing, and structural applications

Composition and Structure
Bamboo filament composites typically consist of natural bamboo fibers embedded in a polymer matrix, such as ;
PLA (polylactic acid),
polypropylene, or epoxy.

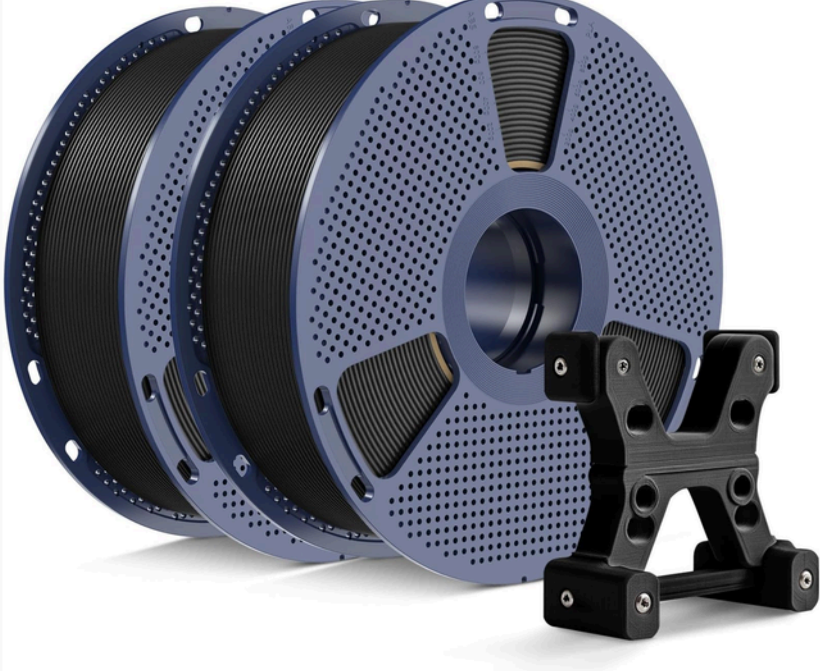
Bamboo fibers are lignocellulosic, containing ;
cellulose (43–47%),
hemicellulose (23–26%), and
lignin (18–29%),
which contribute to their high tensile strength, stiffness, and lightweight properties

Bamboo fibers offer a natural wood-like texture and are sometimes used in bamboo cellulose or nanocrystal formulations to improve mechanical and thermal behavior

The fiber's internal parenchyma and conduit structure influence composite strength and require careful processing to optimize resin penetration and interfacial adhesion

MECHANICAL & THERMAL PROPERTIES

Bamboo Composite



Mechanical and Thermal Properties of Bamboo Composite

Bamboo composites exhibit several advantageous properties:
Tensile strength: Bamboo fibers have tensile strength comparable to natural glass fiber (1.43–1.69 GPa), contributing meaningful reinforcement in PLA or epoxy matrices

Flexural and bending strength:
PLA-based bamboo composites have demonstrated improvements up to 113% in modulus compared to unreinforced PLA, with optimized fiber content around 20–70 wt.% depending on polymer matrix and treatment

Durability: Fiber treatment (chemical, enzymatic, or physical) enhances interfacial bonding, reduces moisture absorption, and improves cohesive strength

Thermal stability: Bamboo composites maintain structural integrity under moderate temperatures, with degradation typically occurring between 200–380 °C, depending on fiber treatment and polymer type

Processing Techniques

Bamboo filament composites can be produced through several methods:
Mechanical or chemical fiber extraction: Mechanical extraction uses enzymes or physical separation; chemical extraction with NaOH or bleaching enhances cellulose content and surface compatibility

Surface modification: Chemical processes (acetylation, silanization, maleination) and enzymatic treatments improve fiber-matrix bonding and mechanical performance.

BAMBOO FILAMENT FOR 3D PRINTING

Additive manufacturing (3D printing): Bamboo fibers are incorporated into filaments used in FDM, SLA, or SLS printing, achieving wood-like appearance, good layer adhesion, and adequate printability. Larger nozzle sizes (≥0.4 mm) accommodate fiber content, and printing temperatures range from 190–220°C

Advanced methods like coreless filament winding mimic bamboo’s natural structural features (diaphragms, hollow internodes) to produce lightweight, high-performance truss composites from carbon fibers or polymers

Environmental and Sustainable Benefits
Bamboo filament composites are highly eco-friendly:
Renewable: Bamboo grows rapidly (few months to maturity) and regenerates readily

Biodegradable: Composites with PLA and natural fiber degrade more quickly than conventional plastics

Low carbon footprint: Replacing petroleum-based polymers reduces environmental pollution and maintains sustainability

BAMBOO FILAMENT FOR 3D PRINTING

Bamboo filament composites have both functional and aesthetic applications:
3D printing: Home decor, kitchen utensils, educational models, artistic sculptures, and prototypes

Structural and polymer composites: Automotive interiors, protective equipment, furniture, packaging, and construction elements

Hybrid composites: Bamboo combined with other natural fibers enhances mechanical, thermal, and moisture-resistance properties for advanced engineering uses

In conclusion, bamboo filament composites merge sustainability with performance, making them an ideal choice for eco-conscious additive manufacturing and structural applications. Their mechanical properties, biodegradability, and unique wood-like appearance appear particularly valuable for modern bio-composites and 3D printed objects

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