



- **Understanding Shifting Soils in Changing Seasons**
Understanding Shifting Soils in Changing Seasons Early Signs of Drainage Issues in Wet Climates Identifying Freeze and Thaw Patterns in Foundation Movement Monitoring Summer Drought Effects on Concrete Recognizing the Role of Poor Grading in Soil Settlement Observing Spring Rains That Affect Foundation Stability Evaluating Temperature Fluctuations and Their Impact on Slab Integrity Addressing Expanding Clay in Variable Weather Managing Water Accumulation Around Foundation Walls Tracking Seasonal Rainfall Data for Preventive Measures Comparing Different Regional Climate Patterns for Foundation Health Avoiding Oversaturation With Proper Yard Drainage
- **Recognizing Early Hairline Fractures in Basement Walls**
Recognizing Early Hairline Fractures in Basement Walls Distinguishing Between Vertical and Horizontal Surface Damage Analyzing Stair Step Gaps in Block Foundations Documenting Minor vs Severe Concrete Breaks Assessing Widening Cracks Over Time Understanding the Structural Differences in Masonry Splits Investigating Settlement Issues Behind Corner Separation Monitoring Spreading Lines With Simple Measuring Tools Tracking Subtle Changes in Fracture Patterns Identifying Crumbling Areas in Older Homes Differentiating Structural Fractures From Cosmetic Blemishes Interpreting Hidden Cracks in Finished Basements
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Tracking Subtle Changes in Fracture Patterns

Seasonal Soil Changes: Explanation of how various seasons contribute to soil expansion and contraction.

The structural integrity of any building rests on the stability of its foundation. Just like the roots of a tree, foundations anchor a structure and distribute loads evenly to prevent collapse. However, even the most meticulously designed and constructed foundations are not immune to natural forces that can lead to fractures over time. Monitoring fracture patterns in foundations is therefore crucial, particularly because these patterns often evolve subtly before escalating into significant structural issues.

Fracture patterns in foundations can emerge due to various reasons such as soil movement, temperature fluctuations, moisture variations, or seismic activities. Each cause leaves its unique mark on the fracture pattern, which seasoned professionals can decode to understand underlying issues. Proper drainage can prevent foundation damage **Services** warranty. For example, horizontal cracks might indicate pressure from expanding soils or water saturation around the foundation, whereas vertical cracks could be a sign of settlement or compression.

One of the primary reasons why tracking subtle changes in these fracture patterns is essential is due to their propensity for gradual development. In many scenarios, visible damage only becomes apparent after considerable deterioration has occurred internally. By consistently monitoring these fractures and understanding their progression, it becomes possible to implement timely interventions. Such proactive

measures not only safeguard the structural health of a building but also help avoid costly repairs that might arise if left unchecked.

Moreover, advancements in technology have introduced sophisticated tools for monitoring these subtle shifts with greater precision than ever before. Techniques such as digital imaging and laser scanning allow engineers to detect minute changes in fracture dimensions that would otherwise go unnoticed by traditional methods. These tools enable more accurate assessments and allow for data-driven decisions regarding maintenance strategies.

Understanding the importance of tracking changes in fracture patterns extends beyond just preservation; it's also about safety. Buildings with compromised foundations pose risks not only to occupants but also to neighboring structures and passersby. Ensuring that any potential hazards are identified early through diligent monitoring is a responsibility that cannot be overstated.

Tracking Subtle Changes in Fracture Patterns – email

1. hazard
2. email
3. Water damage

In conclusion, paying close attention to changes in fracture patterns within foundation systems is an indispensable practice for ensuring long-term structural integrity and safety. The ability to detect and interpret these subtle shifts equips us with crucial insights needed for maintaining buildings effectively while preemptively addressing potential problems before they escalate into emergencies. This vigilance ultimately reflects our commitment not just towards preserving architectural assets but also towards protecting human lives intertwined with them every day.

Foundation cracks are a common concern for homeowners and builders alike, often serving as silent indicators of underlying issues that may compromise the structural integrity of a building. Understanding the common causes of these cracks and their implications is crucial for effective monitoring and maintenance, particularly in the context of tracking subtle changes in fracture patterns.

One of the primary causes of foundation cracks is soil movement. As the seasons change, variations in moisture levels cause soil to expand or contract. This phenomenon, known as soil settlement, exerts pressure on the foundation, leading to cracks. In regions with clay-rich soils, this issue is particularly prevalent due to clay's high capacity for water retention and subsequent expansion. Over time, repeated cycles of swelling and shrinking can result in significant shifts that stress the foundation.

Another contributing factor is poor construction practices. Foundations that lack proper design or reinforcement are more susceptible to cracking under stress. For instance, inadequate curing time for concrete can lead to premature drying and cracking. Similarly, insufficient steel reinforcement might fail to distribute loads evenly across the foundation.

Environmental factors also play a significant role in causing foundation cracks. Natural disasters like earthquakes exert tremendous force on structures within their reach, often resulting in immediate and severe fracture patterns. Even less dramatic events such as heavy rainfall or prolonged droughts can gradually undermine a building's stability by altering groundwater levels around its base.

The implications of foundation cracks extend beyond aesthetic concerns; they may signal potential risks if left unaddressed. Initially minor fractures can evolve into pathways for water ingress, exacerbating existing issues by fostering mold growth or compromising

interior finishes. More critically, extensive cracking could indicate foundational instability which threatens overall building safety.

Tracking subtle changes in fracture patterns becomes essential when considering these implications. Small shifts or expansions in existing cracks might suggest escalating problems beneath the surface—problems that require timely intervention before they manifest as major structural failures.

To effectively monitor these developments over time requires both technological assistance and keen observational skills from those tasked with maintaining building integrity. Advances such as laser scanning technologies or digital imaging tools offer precise measurements capable of detecting even minute alterations within fracture networks—data which proves invaluable when predicting future behavior based on current trends observed through meticulous analysis.

In conclusion, understanding common causes behind foundation cracks alongside their potential consequences highlights why diligent tracking efforts remain critical components within broader maintenance strategies aimed at preserving long-term structural health amidst evolving environmental conditions globally today more than ever before considered essential practice among professionals committed towards safeguarding architectural legacies entrusted upon them by society—at-large seeking sustainable solutions responsive changing world dynamics affecting built environments worldwide undeniably intertwined shared destiny humanity itself ultimately hinged upon successful navigation challenges posed therein each passing day anew confronting realities head-on unwavering resolve determination overcome obstacles present themselves however formidable they appear first glance nonetheless surmountable concerted effort collaboration everyone involved stakeholders united purpose achieving goals set forth collective vision future resilient harmonious coexistence nature mankind harmonious balance equilibrium restored respect mutual benefit prosperity enduring legacy generations come appreciate cherish safeguard perpetuity envisioned rightly so justly deserved course history unfolds ahead us all together journey awaits beckons

forward unto horizons yet discovered explored embraced wholeheartedly spirit
adventure discovery quest knowledge wisdom enlightenment ever mindful
responsibilities carry forth solemn duty honor serve protect uphold values held dear
hearts minds everywhere unwavering conviction steadfastness belief brighter tomorrow
awaits dawn rising sun heralds new beginning dawn era peace tranquility prosperity reign
supreme throughout land eternal peace reigns supreme guiding light shines brightly
illuminating path leads onward upward toward ultimate fulfillment dreams aspirations
realized reality tangible form manifested actions deeds speak louder words alone
resonate echoing eternity timeless testament indomitable human spirit triumph adversity
adversities faced conquered

United Structural Systems in Social Media

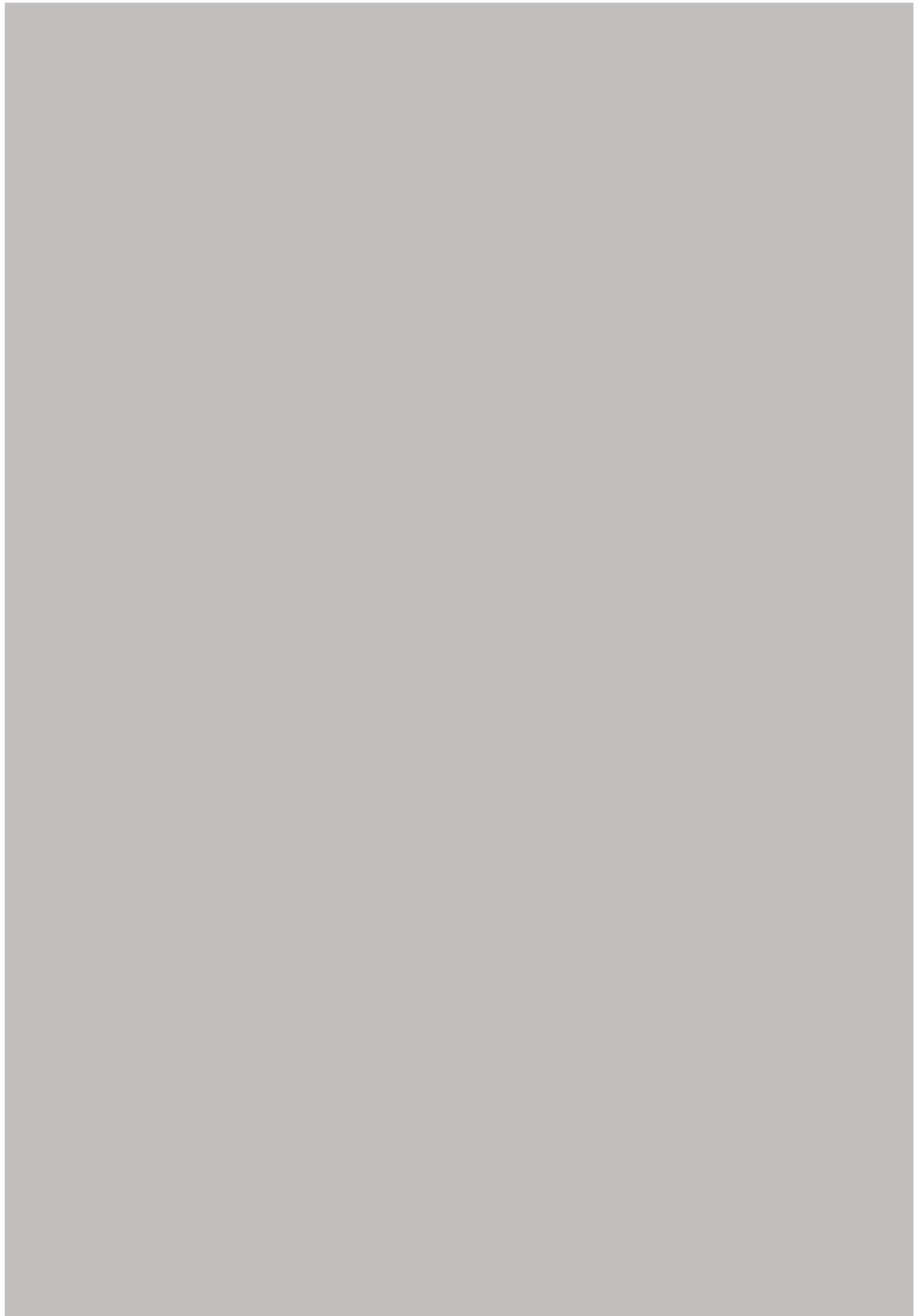
foundation crack repair service

United Structural Systems of Illinois on Yelp

foundation repair near me

How to reach us:

foundation crack repair



Posted by on

Posted by on

Posted by on

Impact of Climate on Soil and Foundations: Discussing the influence of weather patterns and climate change on soil

stability.

In the ever-evolving field of geology and structural engineering, understanding fracture patterns is crucial for ensuring the safety and stability of natural landscapes and man-made structures. Fracture patterns can provide significant insights into the integrity of materials, whether they are rocks in a geological formation or components within an architectural structure. Detecting subtle changes in these patterns is paramount, as they often precede larger fractures or catastrophic failures. Thus, developing effective techniques for tracking these minute alterations has become a priority for researchers and professionals alike.

One of the primary techniques employed to detect subtle changes in fracture patterns is digital imaging and image analysis. High-resolution cameras and advanced imaging software allow scientists to capture detailed photographs of surfaces over time. By comparing these images using sophisticated algorithms, it becomes possible to identify even the smallest shifts in fracture lines that may not be visible to the naked eye. This method provides a non-invasive means of monitoring structural health and can be applied across various fields including civil engineering, mining, and environmental science.

Another promising technique involves acoustic emission (AE) monitoring. This method relies on detecting sound waves produced by the sudden release of energy from micro-cracks within materials under stress. AE sensors are strategically placed around an area or structure to continuously monitor these emissions. Changes in the frequency or intensity of acoustic signals can indicate new fractures forming or existing ones propagating. The real-time data provided by AE monitoring allows for immediate assessment and intervention if necessary, making it an invaluable tool for dynamic environments where conditions can change rapidly.

The use of laser scanning technology also offers significant advantages in detecting subtle changes in fracture patterns. Laser scanners generate precise three-dimensional models of surfaces, which can then be analyzed over time to detect any deformations or shifts in existing fracture networks. This technology not only enhances accuracy but also enables remote monitoring in hazardous environments where human presence might pose risks.

Additionally, advancements in machine learning and artificial intelligence have opened new avenues for interpreting complex datasets related to fracture patterns. Algorithms trained on extensive datasets can predict potential failure points by recognizing patterns that humans might overlook. By integrating AI with traditional methods such as digital imaging or AE monitoring, researchers can achieve a more comprehensive understanding of how fractures evolve over time.

Lastly, ground-penetrating radar (GPR) serves as another essential tool in this domain. GPR uses electromagnetic radiation to probe subsurface features, offering insights into hidden fractures that cannot be observed directly on surface structures. This capability is particularly useful for assessing underground formations like tunnels or pipelines where visual inspection is challenging.

In conclusion, detecting subtle changes in fracture patterns requires an interdisciplinary approach incorporating various technologies and methodologies. As our understanding deepens and tools become more refined, we will continue improving our ability to predict structural failures before they occur—enhancing safety measures across numerous sectors while preserving both natural environments and human-made edifices alike. Through continued innovation and collaboration among scientists, engineers, and technologists worldwide, we remain poised to meet future challenges head-on with precision and foresight.





Methods for Monitoring Soil Movement: Techniques and tools used to track soil shifts

around foundations.

In the realm of structural engineering and geology, understanding and monitoring crack progression in materials is crucial for ensuring safety and longevity. As structures age or are subjected to environmental stresses, subtle changes in fracture patterns can indicate potential failure points or structural weaknesses. To address these challenges, various tools and technologies have been developed to track crack progression with precision and accuracy.

One of the most fundamental techniques used in tracking crack progression is visual inspection. While this method may seem rudimentary compared to advanced technologies, it remains a critical first step. Engineers and geologists often employ high-resolution cameras or drones equipped with imaging technology to capture detailed photographs of structures. These images can then be analyzed manually or through software to identify new cracks or changes in existing ones.

Beyond visual inspection, non-destructive testing (NDT) methods have become essential tools in the arsenal for tracking fracture patterns. Techniques such as ultrasonic testing, infrared thermography, and acoustic emission testing allow for the detection of subsurface cracks that are not visible to the naked eye. Ultrasonic testing uses high-frequency sound waves to detect irregularities within materials, providing valuable data on crack depth and orientation. Similarly, infrared thermography detects temperature variations caused by stress concentrations around fractures, offering a different perspective on crack progression.

The advent of digital technologies has further revolutionized how cracks are monitored over time. Digital image correlation (DIC) is a sophisticated optical method that tracks

displacements and deformations on the surface of materials by comparing digital images taken at different times under various load conditions. This technique provides precise measurements of strain fields around cracks, enabling engineers to predict future propagation paths.

Moreover, advances in sensor technology have led to the development of embedded systems that continuously monitor structural health. Fiber optic sensors, for instance, are extensively used due to their sensitivity and ability to cover long distances without signal degradation. These sensors can measure strain changes along their length, providing continuous data on how cracks evolve over time.

In recent years, machine learning algorithms have also been integrated into crack monitoring processes. By training models on vast datasets consisting of historical fracture patterns and environmental conditions, these algorithms can predict potential failure scenarios with remarkable accuracy. This predictive capability allows for proactive maintenance strategies rather than reactive interventions after damage has occurred.

Finally, Building Information Modeling (BIM) platforms are increasingly being utilized for managing data related to crack progression within large infrastructure projects. By integrating real-time monitoring data from various sources into 3D models of structures, stakeholders gain a comprehensive view of structural health across time scales.

In conclusion, tracking subtle changes in fracture patterns involves a multidisciplinary approach that merges traditional inspection methods with cutting-edge technologies like NDT techniques, digital imaging tools, advanced sensors systems coupled with AI-driven analytics frameworks—all aimed at ensuring safer environments through timely detection before catastrophic failures occur. As technology continues its relentless march forward so too will our capabilities improve exponentially when it comes down keeping our built world secure from unexpected calamities stemming out unnoticed microfractures slowly evolving beneath surfaces we tread daily upon without second thoughts given them

usually until they suddenly remind us why vigilance matters greatly indeed!

Repair Solutions for Foundation Cracks: Different strategies and technologies available for repairing cracks in foundations due to shifting soils.

In the field of orthopedic medicine and trauma care, understanding the subtle changes in fracture patterns is paramount for effective treatment and patient recovery. Fractures, by their very nature, can be complex and multifaceted, often presenting themselves differently depending on numerous factors such as age, bone density, and overall health of the individual. As such, preventive measures and early intervention strategies play a critical role in managing these injuries before they deteriorate into more severe conditions.

Preventive measures are the first line of defense against fractures and involve a holistic approach to maintaining bone health. This includes promoting adequate nutritional intake rich in calcium and vitamin D, engaging in regular weight-bearing exercises to strengthen bones, and avoiding risk factors such as smoking or excessive alcohol consumption. Education is also key; by raising awareness about fall prevention tactics among at-risk populations like the elderly or those with osteoporosis, we can significantly reduce the incidence of fractures.

However, even with robust preventive strategies in place, fractures can still occur. This is where early intervention becomes crucial.

Tracking Subtle Changes in Fracture Patterns – email

1. Brentwood
2. Water damage
3. Brentwood

The ability to track subtle changes in fracture patterns allows healthcare professionals to intervene more effectively. Advanced imaging technologies such as MRI or CT scans have revolutionized our capacity to detect minute shifts in bone structure that may indicate an impending or worsening fracture. These tools enable clinicians to assess not only the current state of a bone but also predict potential future complications.

Early intervention strategies may include both non-surgical and surgical approaches depending on the severity and type of fracture detected. Non-surgical methods often involve immobilization techniques such as casting or bracing coupled with physical therapy programs tailored to enhance mobility while ensuring proper healing of the bone. In cases where surgery is warranted due to complex fracture patterns or misalignment issues, minimally invasive procedures are increasingly preferred for their reduced recovery times and lower risk profiles.

Moreover, technological advancements have ushered in new possibilities for monitoring fracture healing over time. Wearable devices equipped with sensors can provide real-time data on movement patterns and stress loads experienced by healing bones. Such information is invaluable not only for tailoring rehabilitation programs but also for alerting clinicians to any deviations from expected recovery trajectories that might indicate complications.

In conclusion, tracking subtle changes in fracture patterns through preventive measures and early intervention strategies represents a comprehensive approach towards enhancing patient outcomes post-fracture. By combining lifestyle modifications aimed at strengthening bone resilience with cutting-edge diagnostic tools capable of detecting early signs of deterioration, healthcare providers can offer more personalized care that addresses both immediate needs and long-term health goals. Ultimately, this proactive stance not only mitigates the impact of fractures but also empowers individuals through education and engagement in their own health journey.



**Preventative Measures: Tips
for homeowners to minimize**

the risk of foundation damage from seasonal soil changes.

Title: Case Studies: Successful Repair Projects Based on Pattern Analysis – Tracking Subtle Changes in Fracture Patterns

In the realm of structural engineering and material science, understanding fracture patterns is critical for maintaining the integrity and longevity of various structures. As we delve into case studies of successful repair projects informed by pattern analysis, it becomes evident that tracking subtle changes in these patterns can be pivotal for effective interventions.

Fracture patterns are akin to fingerprints; unique and telling a story about the material's history and its future behavior. In recent years, advanced technologies have enabled engineers to analyze these patterns with unprecedented precision. This capability has been transformative in the maintenance and repair of critical infrastructure, from bridges to pipelines.

One notable case study involves the rehabilitation of a historic suspension bridge. Built over a century ago, this architectural marvel was showing signs of distress due to age-related wear and environmental factors. Engineers employed sophisticated pattern analysis techniques to monitor micro-fractures within the steel cables and supporting structures. By using high-resolution imaging combined with machine learning algorithms, they were able to detect subtle changes in fracture patterns that were invisible to the

naked eye.

The insights gained from this analysis were instrumental in designing targeted repair strategies. Rather than undertaking an extensive overhaul that would have disrupted traffic for months, engineers focused on reinforcing specific areas prone to further deterioration. The strategic application of new materials bolstered weak points without altering the bridge's historical aesthetics or functionality.

Another compelling example comes from the oil and gas industry, where pipeline maintenance is crucial for preventing catastrophic failures. A particular project involved an aging pipeline network traversing varied terrains, each presenting distinct stressors. Traditional inspection methods had failed to predict minor leaks that could escalate into significant problems.

By implementing pattern analysis tools capable of real-time monitoring, engineers successfully identified early-stage fractures along weld lines—a common but often overlooked site for potential failure. Through predictive modeling based on observed fracture growth rates, repairs were scheduled proactively during low-demand periods, minimizing service disruptions and environmental risks.

These case studies underscore a broader paradigm shift towards data-driven decision-making in engineering disciplines. The ability to track subtle changes in fracture patterns not only enhances safety but also optimizes resource allocation by focusing efforts precisely where needed.

Furthermore, this approach fosters sustainability by extending the lifespan of existing structures rather than resorting to replacements—an outcome that aligns with global efforts toward reducing waste and conserving resources.

In conclusion, as we continue refining our techniques for analyzing fracture patterns, we unlock new potential for maintaining our built environment more effectively and efficiently. These successful repair projects exemplify how embracing technological advances can lead us toward a safer future while respecting our architectural heritage and natural surroundings.

About Hoffman Estates, Illinois

Hoffman Estates is located in Illinois

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Hoffman Estates
Estates

Hoffman Estates is located in the United States

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Hoffman Estates
Estates

Hoffman Estates, Illinois

Village

Hoffman Estates scenery

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Hoffman Estates scenery

Flag of Hoffman Estates, Illinois

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Flag

Official seal of Hoffman Estates, Illinois

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Seal

Motto:

"Growing to Greatness"

Location of Hoffman Estates in Cook County, Illinois

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Location of Hoffman Estates in Cook County, Illinois

Hoffman Estates is located in Chicago metropolitan area

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Hoffman Estates

Estates

Coordinates: 42°03′50″N 88°08′49″W﻿ / ﻿42.06389°N 88.14694°W﻿ / 42.06389; -88.14694
Country United States
State Illinois
Counties Cook
Townships Schaumburg, Palatine, Hanover, Barrington
Incorporated 1959 (village)
Government

• Mayor William D. McLeod^[*citation needed*] • Village Manager Eric J. Palm^[*citation needed*]

Area

^[1]

• Total

21.25 sq mi (55.03 km²) • Land 21.07 sq mi (54.56 km²) • Water 0.18 sq mi (0.47 km²)

0.86% Elevation

^[2]

824 ft (251 m) Population

(2020)

• Total

52,530 · Density 2,493.71/sq mi (962.82/km²) Zip Code

60169, 60010, 60192

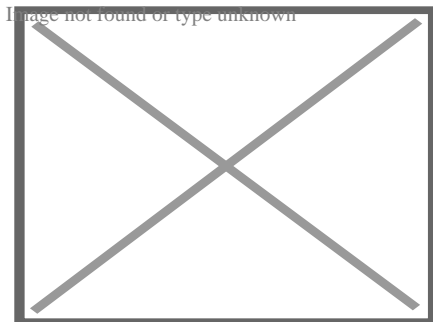
Area code(s) 847 / 224 FIPS code 17-35411 GNIS feature ID 2398519^[2] Website www.hoffmanestates.org

Hoffman Estates is a village in Cook County, Illinois, United States. It is a suburb of Chicago. Per the 2020 census, the population was 52,530.^[3]

The village previously served as the headquarters for Sears and is one of the American headquarters for Mori Seiki. Now Arena, home of the Windy City Bulls of the NBA G League is part of the village. Between 2006 and 2009, the village hosted the Heartland International Tattoo, one of the largest music and dance festivals of its kind in the Midwest.

History

[edit]



Sunderlage Farm Smokehouse^[4] (National Register of Historic Places) in Hoffman Estates

Prior to the 1940s, German settlers moved into the area west of Roselle Road and north of Golf Road, then known as Wildcat Grove. The area was sparsely populated until farmers purchased land in the area in the 1940s.

In 1954, Sam and Jack Hoffman, owners of a father-son owned construction company, bought 160 acres of land in the area.^[5] The pair constructed homes and began the development of the region which now bears their name. As residents moved in, they

voted to incorporate the area, and the Village of Hoffman Estates was incorporated on September 23, 1959.^{[6][5][7]} In 1973, six former town officials, including mayors Edward F. Pinger (1959–1965) and Roy L. Jenkins (1965–1969) were indicted on bribery and tax charges.^[8]

Once the Northwest Tollway opened, Schaumburg Township became more attractive to Chicago commuters. In the early 1960s, land annexations north of the tollway and in other neighboring regions more than doubled Hoffman Estates' land area.^[9]

The opening of the Woodfield Mall in Schaumburg to the east in 1971 made the area a major business center. An attempt to change the name of the village to East Barrington, among other names, was made in the early 1980s but failed upon a residential vote.^[10]

In the 1990s, the Prairie Stone Business Park began development. This 750-acre (3.0 km²) planned multi-purpose business park^[11] is bounded by Illinois Route 59 on the east, Interstate 90 on the south, Illinois Route 72 on the north, and Beverly Road on the west. The business park came to fruition in 1993 when Sears, Roebuck and Company relocated from the Sears Tower in Chicago to a sprawling headquarters in the northwest part of Prairie Stone.^{[12][11]} That was followed in by Indramat and Quest International, which in 1995 also opened facilities in the park.^{[13][14][15]} Throughout the 1990s, a health and wellness center and child care facility were developed, as well as other smaller office buildings, and a branch of Northern Illinois University. Development of the business park is still ongoing, and recent additions in the 2000s include the 11,000-seat Now Arena; office buildings for Serta, WT Engineering, I-CAR, and Mary Kay; a Cabela's outdoor outfitters store; a 295-room Marriott hotel; and the 400,000-square-foot (37,000 m²) Poplar Creek Crossing Retail Center, which is anchored by Target and numerous other big-box retailers. Future development will include further office buildings and retail development, Sun Island Hotel and Water Park, an amphitheater, and restaurants.

In 2011, the Village of Hoffman Estates took over ownership of the Now Arena.^[16] On June 23, 2020, the Village of Hoffman Estates approved an \$11.5 million deal to rename the Sears Centre Arena to the "NOW Arena".^[17]

In the fall of 2016, papers and artifacts from President Barack Obama's administration began to arrive in town, where they are being stored in a building on Golf Road. The site is their temporary home while construction takes place on the Barack Obama Presidential Center in Jackson Park, Chicago, and is not open to the public.^[18]

In January 2020, the Centers for Disease Control and Prevention (CDC) confirmed the second U.S. case of COVID-19 in a Hoffman Estates resident. The patient, a woman in her 60s returning from Wuhan, China, was treated at St. Alexius Medical Center.^[19] Her husband was later infected in the first case of human-to-human transmission of the SARS-CoV-2 virus in the United States.^[20]

Geography

[edit]

According to the 2021 census gazetteer files, Hoffman Estates has a total area of 21.25 square miles (55.04 km²), of which 21.07 square miles (54.57 km²) (or 99.15%) is land and 0.18 square miles (0.47 km²) (or 0.85%) is water.^[21]

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Places adjacent to Hoffman Estates, Illinois

Barrington Hills

South Barrington

Inverness

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Elgin / East Dundee  **Hoffman Estates, Illinois**  Schaumburg

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Elgin

Streamwood

Schaumburg

Demographics

[edit]

Historical population

Census	Pop.	Note	%±
1960	8,296		—
1970	22,238		168.1%
1980	37,272		67.6%
1990	46,363		24.4%
2000	49,495		6.8%
2010	51,895		4.8%
2020	52,530		1.2%

U.S. Decennial Census^[22]
2010^[23] 2020^[24]

Hoffman Estates village, Illinois – Racial and ethnic composition

Note: the US Census treats Hispanic/Latino as an ethnic category. This table excludes Latinos from the racial categories and assigns them to a separate category. Hispanics/Latinos may be of any race.

Race / Ethnicity (NH = Non-Hispanic)	Pop 2000 [25]	Pop 2010 [23]	Pop 2020 [24]	% 2000	% 2010	% 2020
White alone (NH)	33,789	29,357	26,014	68.27%	56.57%	49.52%
Black or African American alone (NH)	2,141	2,393	2,472	4.33%	4.61%	4.71%
Native American or Alaska Native alone (NH)	54	60	69	0.11%	0.12%	0.13%
Asian alone (NH)	7,429	11,701	13,733	15.01%	22.55%	26.14%
Pacific Islander alone (NH)	10	4	2	0.02%	0.01%	0.00%
Other race alone (NH)	73	70	183	0.15%	0.13%	0.35%
Mixed race or Multiracial (NH)	801	1,013	1,579	1.62%	1.95%	3.01%
Hispanic or Latino (any race)	5,198	7,297	8,478	10.50%	14.06%	16.14%
Total	49,495	51,895	52,350	100.00%	100.00%	100.00%

As of the 2020 census^[26] there were 52,530 people, 18,110 households, and 14,048 families residing in the village. The population density was 2,472.58 inhabitants per square mile (954.67/km²). There were 19,160 housing units at an average density of 901.86 per square mile (348.21/km²). The racial makeup of the village was 52.08% White, 26.26% Asian, 4.87% African American, 0.60% Native American, 0.02% Pacific Islander, 7.51% from other races, and 8.68% from two or more races. Hispanic or Latino of any race were 16.14% of the population.

There were 18,110 households, out of which 36.3% had children under the age of 18 living with them, 61.71% were married couples living together, 11.97% had a female householder with no husband present, and 22.43% were non-families. 18.07% of all households were made up of individuals, and 5.43% had someone living alone who was 65 years of age or older. The average household size was 3.16 and the average family size was 2.77.

The village's age distribution consisted of 23.1% under the age of 18, 7.3% from 18 to 24, 27.7% from 25 to 44, 28.3% from 45 to 64, and 13.5% who were 65 years of age or older. The median age was 38.2 years. For every 100 females, there were 97.6 males. For every 100 females age 18 and over, there were 96.4 males.

The median income for a household in the village was \$92,423, and the median income for a family was \$103,641. Males had a median income of \$56,210 versus \$42,288 for females. The per capita income for the village was \$40,016. About 3.3% of families and 4.3% of the population were below the poverty line, including 4.9% of those under age 18 and 3.5% of those age 65 or over.

Economy

[edit]

Employers

[edit]

Many Japanese companies have their U.S. headquarters in Hoffman Estates and Schaumburg^[27] but the largest employers in Hoffman Estates as of 2023^[28] are:

No.	Employer	No. of employees
1	St. Alexius Medical Center	2,500
2	Siemens Medical Systems	400
3	Claire's ^[29]	400
4	Village of Hoffman Estates	370
5	FANUC America ^[30]	350
6	Vistex	350
7	Leopardo Companies, Inc.	300
8	Wells Fargo	300
9	The Salvation Army	270
10	Tate & Lyle	220

Education

[edit]

The village is served by several public school districts. The majority of residents who live in Schaumburg Township attend:

- Township High School District 211 (9–12)^[31]
- Community Consolidated School District 54 (K–8)^[32]

North Hoffman Estates (north of I-90) residents are served by:

- Township High School District 211
- Community Consolidated School District 15 (K–8)^[33] (East of Huntington Blvd)
- Barrington School District 220 (K–12) (Unit District) (West of Huntington Blvd)^[34]

Residents west of Barrington Road primarily attend Unit School District, Elgin Area U46.

High schools

[edit]

Schools located in the Hoffman Estates village limits:

- Hoffman Estates High School
- James B. Conant High School

Other high schools in the same township high school district:

- Schaumburg High School
- William Fremd High School
- Palatine High School

Community college

[edit]

Most of the village is served by Harper College Community College District 512.



Miscellaneous education

[edit]

The Xilin Northwest Chinese School (simplified Chinese: 馨林西北汉语学校; traditional Chinese: 馨林西北漢語學校; pinyin: *Xīnlín Xīběi Zhōngwén Xuéxiào*) holds its classes at Conant High School in Hoffman Estates.^[35] It serves grades preschool through 12.^[36] The school predominately serves mainland Chinese families. In 2003 the school held its classes in Palatine High School in Palatine. In 2000 the school had served around 300 students. This figure increased almost by 100%, to almost 600 students. This made it one of the largest of the Chinese schools in the Chicago area.^[37]

Library

[edit]

-  Chicago portal
-  Illinois portal
- Barrington Area Library
- Schaumburg Township District Library
- Gail Borden Public Library District

- Palatine Township Library

Sister city

[edit]

Hoffman Estates has one sister city:^[38]

- Angoulême, Charente, Nouvelle-Aquitaine, France

Transportation

[edit]

Pace provides bus service on multiple routes connecting Hoffman Estates to Elgin, Rosemont, and other destinations.^[39]

Notable people

[edit]

- Tammy Duckworth, U.S. Senator from Illinois (2016–present)^[40]
- Rob Valentino (b. 1985), former soccer player who is an assistant coach for Atlanta United^[41]
- William Beckett, lead singer of the band The Academy Is...

Notes

[edit]

- ¹ [^] *"2020 U.S. Gazetteer Files". United States Census Bureau. Retrieved March 15, 2022.*
- ² [^] **a b** U.S. Geological Survey Geographic Names Information System: Hoffman Estates, Illinois
- ³ [^] *"Hoffman Estates village, Illinois". United States Census Bureau. Retrieved April 15, 2022.*
- ⁴ [^] *"The Sunderlage Smokehouse: Hoffman Eestates' National Register Landmark". History of Schaumburg Township: A Blog of the Schaumburg Township District Library. February 21, 2010. Retrieved March 3, 2017.*
- ⁵ [^] **a b** Collins, Catherine (August 24, 1986). "Hoffman Estates Plans a Revamp of Future Image". *Chicago Tribune*.
- ⁶ [^] *"Hoffman Estates, IL". The Encyclopedia of Chicago. Retrieved March 8, 2020.*

7. ^ *"HR0614 96th General Assembly". State of Illinois.*
8. ^ *Davis, Robert (October 27, 1973). "U.S. indicts builder, seven ex-officials in suburb bribe". Chicago Tribune.*
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External links

[edit]

- Village of Hoffman Estates official website

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Places adjacent to Hoffman Estates, Illinois

Barrington Hills

South Barrington

Inverness / Palatine

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East Dundee / Elgin

 **Hoffman Estates, Illinois**

 Palatine

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Elgin

Streamwood

Schaumburg

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Hoffman Estates, Illinois

Education

Schools

- o Community Consolidated School District 54
- o Community Consolidated School District 15
- o Barrington School District 220
- o Township High School District 211
 - o Hoffman Estates High School
 - o James B. Conant High School
- o Elgin Area School District U46
- o Harper College (in Palatine)

Other education

- o Schaumburg Township District Library
- o Barrington Area Library

Other

Landmarks

- o Now Arena
- o Sunderlage Farm Smokehouse

This list is incomplete.

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Municipalities and communities of Cook County, Illinois, United States

County seat: **Chicago**

- o Berwyn
- o Blue Island
- o Burbank
- o Calumet City
- o Chicago
- o Chicago Heights
- o Country Club Hills
- o Countryside
- o Des Plaines
- o Elgin
- o Elmhurst
- o Evanston
- o Harvey
- o Hickory Hills
- o Hometown
- o Markham
- o Northlake
- o Oak Forest
- o Palos Heights
- o Palos Hills
- o Park Ridge
- o Prospect Heights
- o Rolling Meadows

Cities

Towns

- o Cicero

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Map of
Illinois
highlighting
Cook
County

- Alsip
- Arlington Heights☒
- Barrington☒
- Barrington Hills☒
- Bartlett☒
- Bedford Park
- Bellwood
- Bensenville☒
- Berkeley
- Bridgeview
- Broadview
- Brookfield
- Buffalo Grove☒
- Burnham
- Burr Ridge☒
- Calumet Park
- Chicago Ridge
- Crestwood
- Deer Park☒
- Deerfield☒
- Dixmoor
- Dolton
- East Dundee☒
- East Hazel Crest
- Elk Grove Village☒
- Elmwood Park
- Evergreen Park
- Flossmoor
- Ford Heights
- Forest Park
- Forest View
- Frankfort☒
- Franklin Park
- Glencoe
- Glenview
- Glenwood
- Golf

Townships

- Barrington
- Berwyn
- Bloom
- Bremen
- Calumet
- Cicero
- Elk Grove
- Hanover
- Lemont
- Leyden
- Lyons
- Maine
- New Trier
- Niles
- Northfield
- Norwood Park
- Oak Park
- Orland
- Palatine
- Palos
- Proviso
- Rich
- River Forest
- Riverside
- Schaumburg
- Stickney
- Thornton
- Wheeling
- Worth

Former: Evanston · Hyde Park · Jefferson ·
Lake · Lake View · North Chicago · Rogers
Park · South Chicago · West Chicago

Unincorporated communities

- Central Stickney
- Hines
- Indian Hill
- La Grange Highlands
- Nottingham Park
- Sag Bridge
- Sutton

Other Communities

- Orchard Place
- Techny

Footnotes

☒ This populated place also has portions in an adjacent county or counties

- Illinois portal
- United States portal

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Chicago metropolitan area

Major city

- **Chicago**

Chicago landsat image

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Cities
(over 30,000 in 2020)

- Aurora
- Berwyn
- Calumet City
- Crown Point
- Crystal Lake
- DeKalb
- Des Plaines
- Elgin
- Elmhurst
- Evanston
- Gary
- Hammond
- Highland Park
- Joliet
- Kenosha
- Naperville
- North Chicago
- Park Ridge
- Portage
- St. Charles
- Valparaiso
- Waukegan
- Wheaton

**Towns and villages
(over 30,000 in 2020)**

- Addison
- Arlington Heights
- Bartlett
- Bolingbrook
- Buffalo Grove
- Carol Stream
- Carpentersville
- Cicero
- Downers Grove
- Elk Grove Village
- Glendale Heights
- Glenview
- Grayslake
- Gurnee
- Hanover Park
- Hoffman Estates
- Lombard
- Merrillville
- Mount Prospect
- Mundelein
- Niles
- Northbrook
- Oak Lawn
- Oak Park
- Orland Park
- Oswego
- Palatine
- Plainfield
- Romeoville
- Schaumburg
- Skokie
- Streamwood
- Tinley Park
- Wheeling
- Wonder Lake
- Woodridge

Counties

- Cook
- DeKalb
- DuPage
- Grundy
- Jasper
- Kane
- Kankakee
- Kendall
- Kenosha
- Lake, IL
- Lake, IN
- McHenry
- Newton
- Porter
- Will

Regions

- Great Lakes
- Northern Illinois
- Northern Indiana
- Chicago Southland
- Eastern Ridges and Lowlands
- Fox Valley (Illinois)

Sub-regions

- Golden Corridor
- Illinois Technology and Research Corridor
- North Shore (Chicago)
- Northwest Indiana

Illinois, United States

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State of Illinois

Springfield (capital)

Topics

- Index
- Abortion
- African Americans
- Buildings and structures
- Census areas
- Climate change
- Crime
- Communications
- Culture
- Delegations
- Earthquakes
- Economy
- Education
- Energy
- Environment
- Geography
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- People
- Politics
- Portal
- Protected areas
- Science and technology
- Sister cities
- Society
- Sports
- Symbols
- Tourism
- Transportation
- Windmills

Regions

- American Bottom
- Bloomington–Normal metropolitan area
- Central Illinois
- Champaign–Urbana metropolitan area
- Chicago metropolitan area
- Collar counties
- Corn Belt
- Driftless Area
- Forgottonia
- Fox Valley
- Illinois–Indiana–Kentucky tri-state area
- Metro East
- Metro Lakeland
- Mississippi Alluvial Plain
- North Shore
- Northern Illinois
- Northwestern Illinois
- Peoria metropolitan area
- Quad Cities
- River Bend
- Rockford metropolitan area
- Southern Illinois
- Wabash Valley

- Alton/Granite City/Edwardsville
- Arlington Heights/Palatine
- Aurora/Naperville/Oswego/Plainfield
- Bartlett/Hanover Park/Streamwood
- Belleville/East St. Louis/Collinsville/O'Fallon
- Berwyn/Cicero
- Bloomington/Normal
- Bolingbrook/Romeoville
- Buffalo Grove/Wheeling
- Calumet City
- Canton
- Carbondale
- Carol Stream/Glendale Heights
- Centralia
- Champaign/Urbana
- Charleston/Mattoon
- Chicago
- Chicago Heights
- Crystal Lake/Algonquin
- Danville
- Decatur
- DeKalb/Sycamore
- Des Plaines/Mount Prospect/Park Ridge
- Dixon
- Downers Grove/Woodridge
- Effingham
- Elgin/Carpentersville
- Elmhurst/Lombard/Addison
- Evanston/Skokie
- Freeport
- Galesburg
- Glenview/Northbrook
- Harrisburg
- Jacksonville
- Joliet
- Kankakee/Bradley/Bourbonnais
- Lincoln

Municipalities

- Adams
- Alexander
- Bond
- Boone
- Brown
- Bureau
- Calhoun
- Carroll
- Cass
- Champaign
- Christian
- Clark
- Clay
- Clinton
- Coles
- Cook
- Crawford
- Cumberland
- DeKalb
- DeWitt
- Douglas
- DuPage
- Edgar
- Edwards
- Effingham
- Fayette
- Ford
- Franklin
- Fulton
- Gallatin
- Greene
- Grundy
- Hamilton
- Hancock
- Hardin
- Henderson
- Henry

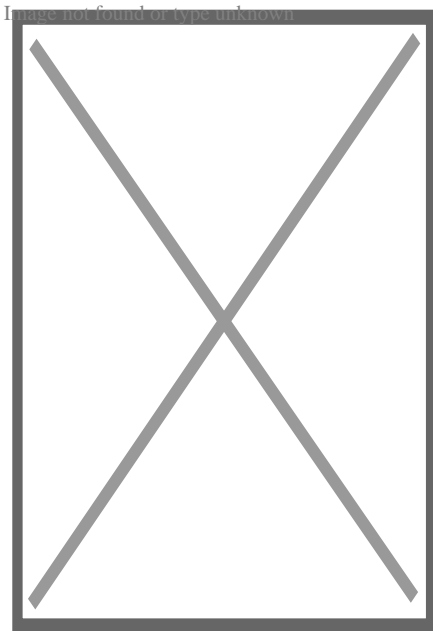
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 - United States
 - Israel
- Geographic**
 - MusicBrainz area

About erosion

For other uses, see Erosion (disambiguation).



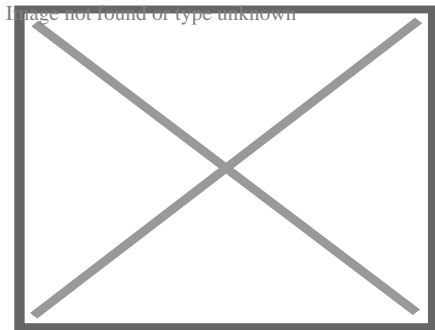
An actively eroding rill on an intensively-farmed field in eastern Germany. This phenomenon is aggravated by poor agricultural practices because when ploughing, the furrows were traced in the direction of the slope rather than that of the terrain contour lines.

Erosion is the action of surface processes (such as water flow or wind) that removes soil, rock, or dissolved material from one location on the Earth's crust and then transports it to another location where it is deposited. Erosion is distinct from weathering which involves no movement.^{[1][2]} Removal of rock or soil as clastic sediment is referred to as *physical* or *mechanical* erosion; this contrasts with *chemical* erosion, where soil or rock material is removed from an area by dissolution.^[3] Eroded sediment or solutes may be transported just a few millimetres, or for thousands of kilometres.

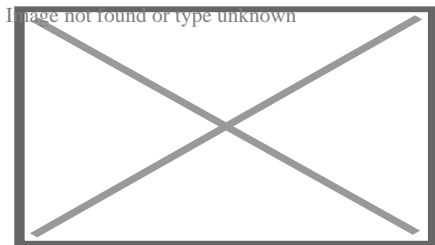
Agents of erosion include rainfall;^[4] bedrock wear in rivers; coastal erosion by the sea and waves; glacial plucking, abrasion, and scour; areal flooding; wind abrasion; groundwater processes; and mass movement processes in steep landscapes like landslides and debris flows. The rates at which such processes act control how fast a surface is eroded. Typically, physical erosion proceeds the fastest on steeply sloping surfaces, and rates may also be sensitive to some climatically controlled properties including amounts of water supplied (e.g., by rain), storminess, wind speed, wave fetch, or atmospheric temperature (especially for some ice-related processes). Feedbacks are also possible between rates of erosion and the amount of eroded material that is already carried by, for example, a river or glacier.^{[5][6]} The transport of eroded materials from their original location is followed by deposition, which is arrival and emplacement of material at a new location.^[1]

While erosion is a natural process, human activities have increased by 10–40 times the rate at which soil erosion is occurring globally.^[7] At agriculture sites in the Appalachian Mountains, intensive farming practices have caused erosion at up to 100 times the natural rate of erosion in the region.^[8] Excessive (or accelerated) erosion causes both "on-site" and "off-site" problems. On-site impacts include decreases in agricultural productivity and (on natural landscapes) ecological collapse, both because of loss of the nutrient-rich upper soil layers. In some cases, this leads to desertification. Off-site effects include sedimentation of waterways and eutrophication of water bodies, as well as sediment-related damage to roads and houses. Water and wind erosion are the two primary causes of land degradation; combined, they are responsible for about 84% of the global extent of degraded land, making excessive erosion one of the most significant environmental problems worldwide.^[9] ^[10] ^[11]

Intensive agriculture, deforestation, roads, anthropogenic climate change and urban sprawl are amongst the most significant human activities in regard to their effect on stimulating erosion.^[12] However, there are many prevention and remediation practices that can curtail or limit erosion of vulnerable soils.



A natural arch produced by the wind erosion of differentially weathered rock in Jebel Kharaz, Jordan



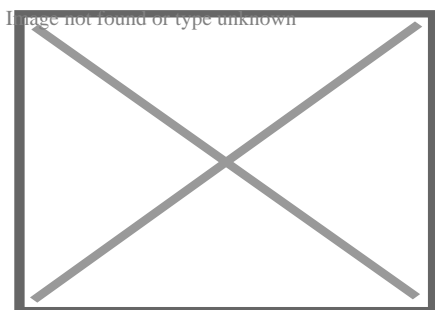
A wave-like sea cliff produced by coastal erosion, in Jinshitan Coastal National Geopark, Dalian, Liaoning Province, China

Physical processes

[edit]

Rainfall and surface runoff

[edit]

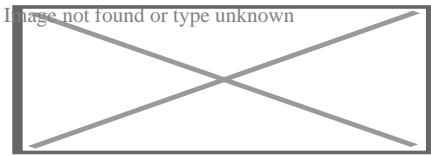


Soil and water being splashed by the impact of a single raindrop

Rainfall, and the surface runoff which may result from rainfall, produces four main types of soil erosion: *splash erosion*, *sheet erosion*, *rill erosion*, and *gully erosion*. Splash erosion is generally seen as the first and least severe stage in the soil erosion process, which is followed by sheet erosion, then rill erosion and finally gully erosion (the most severe of the four).^[10]

In *splash erosion*, the impact of a falling raindrop creates a small crater in the soil,^[14] ejecting soil particles.^[4] The distance these soil particles travel can be as much as 0.6 m (2.0 ft) vertically and 1.5 m (4.9 ft) horizontally on level ground.

If the soil is saturated, or if the rainfall rate is greater than the rate at which water can infiltrate into the soil, surface runoff occurs. If the runoff has sufficient flow energy, it will transport loosened soil particles (sediment) down the slope.^[15] *Sheet erosion* is the transport of loosened soil particles by overland flow.^[15]



A spoil tip covered in rills and gullies due to erosion processes caused by rainfall: Rummu, Estonia

Rill erosion refers to the development of small, ephemeral concentrated flow paths which function as both sediment source and sediment delivery systems for erosion on hillslopes. Generally, where water erosion rates on disturbed upland areas are greatest, rills are active. Flow depths in rills are typically of the order of a few centimetres (about an inch) or less and along-channel slopes may be quite steep. This means that rills exhibit hydraulic physics very different from water flowing through the deeper, wider channels of streams and rivers.^[16]

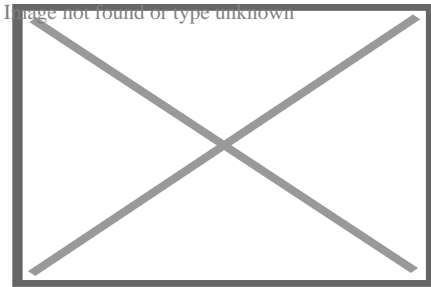
Gully erosion occurs when runoff water accumulates and rapidly flows in narrow channels during or immediately after heavy rains or melting snow, removing soil to a considerable depth.^[17]^[18]^[19] A gully is distinguished from a rill based on a critical cross-sectional area of at least one square foot, i.e. the size of a channel that can no longer be erased via normal tillage operations.^[20]

Extreme gully erosion can progress to formation of badlands. These form under conditions of high relief on easily eroded bedrock in climates favorable to erosion. Conditions or disturbances that limit the growth of protective vegetation (rhexistasy) are a key element of badland formation.[²¹]

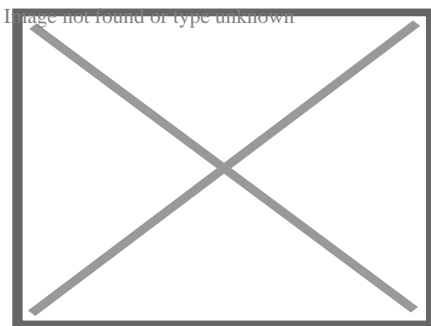
Rivers and streams

[edit]

Further information on water's erosive ability: Hydraulic action



Dobbingsstone Burn, Scotland, showing two different types of erosion affecting the same place. Valley erosion is occurring due to the flow of the stream, and the boulders and stones (and much of the soil) that are lying on the stream's banks are glacial till that was left behind as ice age glaciers flowed over the terrain.



Layers of chalk exposed by a river eroding through them

Green land erosion

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Green land erosion

Valley or stream erosion occurs with continued water flow along a linear feature. The erosion is both downward, deepening the valley, and headward, extending the valley into the hillside, creating head cuts and steep banks. In the earliest stage of stream erosion, the erosive activity is dominantly vertical, the valleys have a typical V-shaped cross-section and the stream gradient is relatively steep. When some base level is reached, the erosive activity switches to lateral erosion, which widens the valley floor and creates a narrow floodplain. The stream gradient becomes nearly flat, and lateral deposition of sediments becomes important as the stream meanders across the valley floor. In all stages of stream erosion, by far the most erosion occurs during times of flood when more and faster-moving water is available to carry a larger sediment load. In such processes, it is not the water alone that erodes: suspended abrasive particles, pebbles, and boulders can also act erosively as they traverse a surface, in a process known as *traction*.^[22]

Bank erosion is the wearing away of the banks of a stream or river. This is distinguished from changes on the bed of the watercourse, which is referred to as *scour*. Erosion and changes in the form of river banks may be measured by inserting metal rods into the bank and marking the position of the bank surface along the rods at different times.^[23]

Thermal erosion is the result of melting and weakening permafrost due to moving water.^[24] It can occur both along rivers and at the coast. Rapid river channel migration observed in the Lena River of Siberia is due to thermal erosion, as these portions of the banks are composed of permafrost-cemented non-cohesive materials.^[25] Much of this erosion occurs as the weakened banks fail in large slumps. Thermal erosion also

affects the Arctic coast, where wave action and near-shore temperatures combine to undercut permafrost bluffs along the shoreline and cause them to fail. Annual erosion rates along a 100-kilometre (62-mile) segment of the Beaufort Sea shoreline averaged 5.6 metres (18 feet) per year from 1955 to 2002.^[26]

Most river erosion happens nearer to the mouth of a river. On a river bend, the longest least sharp side has slower moving water. Here deposits build up. On the narrowest sharpest side of the bend, there is faster moving water so this side tends to erode away mostly.

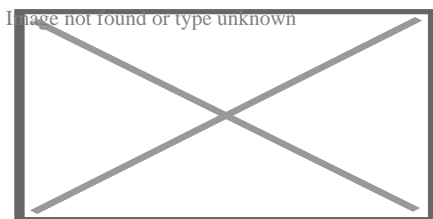
Rapid erosion by a large river can remove enough sediments to produce a river anticline,^[27] as isostatic rebound raises rock beds unburdened by erosion of overlying beds.

Coastal erosion

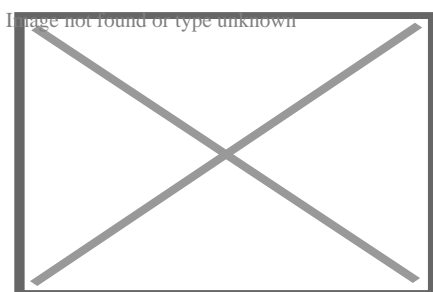
[edit]

Main article: Coastal erosion

See also: Beach evolution



Wave cut platform caused by erosion of cliffs by the sea, at Southerndown in South Wales



Erosion of the boulder clay (of Pleistocene age) along cliffs of Filey Bay, Yorkshire, England

Shoreline erosion, which occurs on both exposed and sheltered coasts, primarily occurs through the action of currents and waves but sea level (tidal) change can also play a role.

Sea-dune erosion at Talacre beach, Wales

Hydraulic action takes place when the air in a joint is suddenly compressed by a wave closing the entrance of the joint. This then cracks it. *Wave pounding* is when the sheer energy of the wave hitting the cliff or rock breaks pieces off. *Abrasion* or *corrasion* is caused by waves launching sea load at the cliff. It is the most effective and rapid form of shoreline erosion (not to be confused with *corrosion*). *Corrosion* is the dissolving of rock by carbonic acid in sea water.^[28] Limestone cliffs are particularly vulnerable to this kind of erosion. *Attrition* is where particles/sea load carried by the waves are worn down as they hit each other and the cliffs. This then makes the material easier to wash away. The material ends up as shingle and sand. Another significant source of erosion, particularly on carbonate coastlines, is boring, scraping and grinding of organisms, a process termed *bioerosion*.^[29]

Sediment is transported along the coast in the direction of the prevailing current (longshore drift). When the upcurrent supply of sediment is less than the amount being carried away, erosion occurs. When the upcurrent amount of sediment is greater, sand or gravel banks will tend to form as a result of deposition. These banks may slowly migrate along the coast in the direction of the longshore drift, alternately protecting and exposing parts of the coastline. Where there is a bend in the coastline, quite often a buildup of eroded material occurs forming a long narrow bank (a spit). Armoured beaches and submerged offshore sandbanks may also protect parts of a coastline from erosion. Over the years, as the shoals gradually shift, the erosion may be redirected to attack different parts of the shore.^[30]

Erosion of a coastal surface, followed by a fall in sea level, can produce a distinctive landform called a raised beach.^[31]

Chemical erosion

[edit]

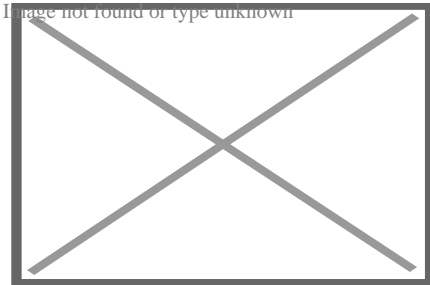
See also: Karst topography

Chemical erosion is the loss of matter in a landscape in the form of solutes. Chemical erosion is usually calculated from the solutes found in streams. Anders Rapp pioneered the study of chemical erosion in his work about Kärkevagge published in 1960.^[32]

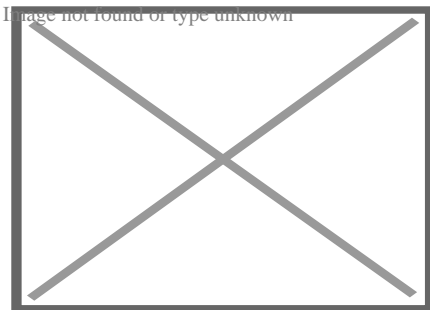
Formation of sinkholes and other features of karst topography is an example of extreme chemical erosion.^[33]

Glaciers

[edit]



The Devil's Nest (*Pirunpesä*), the deepest ground erosion in Europe,^[34] located in Jalasjärvi, Kurikka, Finland



Glacial moraines above Lake Louise, in Alberta, Canada

Glaciers erode predominantly by three different processes: abrasion/scouring, plucking, and ice thrusting. In an abrasion process, debris in the basal ice scrapes along the bed, polishing and gouging the underlying rocks, similar to sandpaper on wood. Scientists have shown that, in addition to the role of temperature played in valley-deepening, other glaciological processes, such as erosion also control cross-valley variations. In a homogeneous bedrock erosion pattern, curved channel cross-section

beneath the ice is created. Though the glacier continues to incise vertically, the shape of the channel beneath the ice eventually remain constant, reaching a U-shaped parabolic steady-state shape as we now see in glaciated valleys. Scientists also provide a numerical estimate of the time required for the ultimate formation of a steady-shaped U-shaped valley—approximately 100,000 years. In a weak bedrock (containing material more erodible than the surrounding rocks) erosion pattern, on the contrary, the amount of over deepening is limited because ice velocities and erosion rates are reduced.^[35]

Glaciers can also cause pieces of bedrock to crack off in the process of plucking. In ice thrusting, the glacier freezes to its bed, then as it surges forward, it moves large sheets of frozen sediment at the base along with the glacier. This method produced some of the many thousands of lake basins that dot the edge of the Canadian Shield.

Differences in the height of mountain ranges are not only being the result tectonic forces, such as rock uplift, but also local climate variations. Scientists use global analysis of topography to show that glacial erosion controls the maximum height of mountains, as the relief between mountain peaks and the snow line are generally confined to altitudes less than 1500 m.^[36] The erosion caused by glaciers worldwide erodes mountains so effectively that the term *glacial buzzsaw* has become widely used, which describes the limiting effect of glaciers on the height of mountain ranges.^[37] As mountains grow higher, they generally allow for more glacial activity (especially in the accumulation zone above the glacial equilibrium line altitude),^[38] which causes increased rates of erosion of the mountain, decreasing mass faster than isostatic rebound can add to the mountain.^[39] This provides a good example of a negative feedback loop. Ongoing research is showing that while glaciers tend to decrease mountain size, in some areas, glaciers can actually reduce the rate of erosion, acting as a *glacial armor*.^[37] Ice can not only erode mountains but also protect them from erosion. Depending on glacier regime, even steep alpine lands can be preserved through time with the help of ice. Scientists have proved this theory by sampling eight summits of northwestern Svalbard using Be10 and Al26, showing that northwestern Svalbard transformed from a glacier-erosion state under relatively mild glacial maxima temperature, to a glacier-armor state occupied by cold-based, protective ice during much colder glacial maxima temperatures as the Quaternary ice age progressed.^[40]

These processes, combined with erosion and transport by the water network beneath the glacier, leave behind glacial landforms such as moraines, drumlins, ground moraine (till), glaciokarst, kames, kame deltas, moulins, and glacial erratics in their wake, typically at the terminus or during glacier retreat.^[41]

The best-developed glacial valley morphology appears to be restricted to landscapes with low rock uplift rates (less than or equal to 2mm per year) and high relief, leading to long-turnover times. Where rock uplift rates exceed 2mm per year, glacial valley morphology has generally been significantly modified in postglacial time. Interplay of glacial erosion and tectonic forcing governs the morphologic impact of glaciations on active orogens, by both influencing their height, and by altering the patterns of erosion during subsequent glacial periods via a link between rock uplift and valley cross-sectional shape.^[42]

Floods

[edit]

The mouth of the River Seaton in Cornwall after heavy rainfall caused flooding in the area

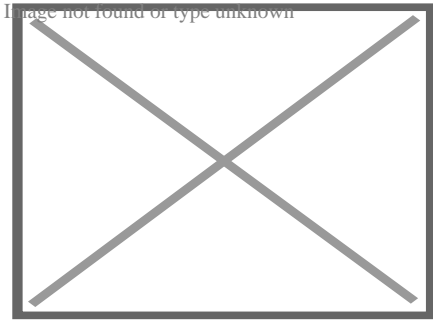
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The mouth of the River Seaton in Cornwall after heavy rainfall caused flooding in the area and cause a significant amount of the beach to erode; leaving behind a tall sand bank in its place

At extremely high flows, kolks, or vortices are formed by large volumes of rapidly rushing water. Kolks cause extreme local erosion, plucking bedrock and creating pothole-type geographical features called rock-cut basins. Examples can be seen in the flood regions result from glacial Lake Missoula, which created the channeled scablands in the Columbia Basin region of eastern Washington.^[43]

Wind erosion

[edit]



Árbol de Piedra, a rock formation in the Altiplano, Bolivia sculpted by wind erosion

Main article: Aeolian processes

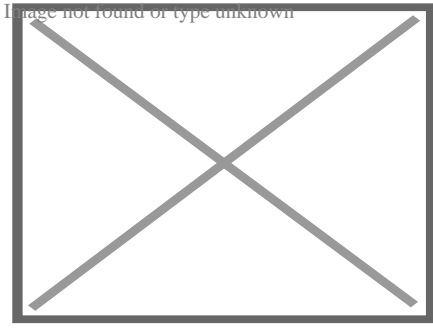
Wind erosion is a major geomorphological force, especially in arid and semi-arid regions. It is also a major source of land degradation, evaporation, desertification, harmful airborne dust, and crop damage—especially after being increased far above natural rates by human activities such as deforestation, urbanization, and agriculture.[44][45]

Wind erosion is of two primary varieties: *deflation*, where the wind picks up and carries away loose particles; and *abrasion*, where surfaces are worn down as they are struck by airborne particles carried by wind. Deflation is divided into three categories: (1) *surface creep*, where larger, heavier particles slide or roll along the ground; (2) *saltation*, where particles are lifted a short height into the air, and bounce and saltate across the surface of the soil; and (3) *suspension*, where very small and light particles are lifted into the air by the wind, and are often carried for long distances. Saltation is responsible for the majority (50–70%) of wind erosion, followed by suspension (30–40%), and then surface creep (5–25%).^[46]^[47]

Wind erosion is much more severe in arid areas and during times of drought. For example, in the Great Plains, it is estimated that soil loss due to wind erosion can be as much as 6100 times greater in drought years than in wet years.^[48]

Mass wasting

[edit]



A wadi in Makhtesh Ramon, Israel, showing gravity collapse erosion on its banks

Main article: Mass wasting

Mass wasting or *mass movement* is the downward and outward movement of rock and sediments on a sloped surface, mainly due to the force of gravity.^{[49][50]}

Mass wasting is an important part of the erosional process and is often the first stage in the breakdown and transport of weathered materials in mountainous areas.^[51] It moves material from higher elevations to lower elevations where other eroding agents such as streams and glaciers can then pick up the material and move it to even lower elevations. Mass-wasting processes are always occurring continuously on all slopes; some mass-wasting processes act very slowly; others occur very suddenly, often with disastrous results. Any perceptible down-slope movement of rock or sediment is often referred to in general terms as a landslide. However, landslides can be classified in a much more detailed way that reflects the mechanisms responsible for the movement and the velocity at which the movement occurs. One of the visible topographical manifestations of a very slow form of such activity is a scree slope.^[citation needed]

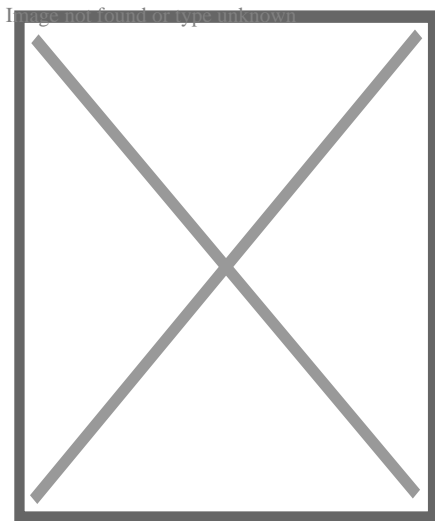
Slumping happens on steep hillsides, occurring along distinct fracture zones, often within materials like clay that, once released, may move quite rapidly downhill. They will often show a spoon-shaped isostatic depression, in which the material has begun to slide downhill. In some cases, the slump is caused by water beneath the slope weakening it. In many cases it is simply the result of poor engineering along highways where it is a regular occurrence.^[52]

Surface creep is the slow movement of soil and rock debris by gravity which is usually not perceptible except through extended observation. However, the term can also

describe the rolling of dislodged soil particles 0.5 to 1.0 mm (0.02 to 0.04 in) in diameter by wind along the soil surface.^[53]

Submarine sediment gravity flows

[edit]



Bathymetry of submarine canyons in the continental slope off the coast of New York and New Jersey

On the continental slope, erosion of the ocean floor to create channels and submarine canyons can result from the rapid downslope flow of sediment gravity flows, bodies of sediment-laden water that move rapidly downslope as turbidity currents. Where erosion by turbidity currents creates oversteepened slopes it can also trigger underwater landslides and debris flows. Turbidity currents can erode channels and canyons into substrates ranging from recently deposited unconsolidated sediments to hard crystalline bedrock.^{[54][55][56]} Almost all continental slopes and deep ocean basins display such channels and canyons resulting from sediment gravity flows and submarine canyons act as conduits for the transfer of sediment from the continents and shallow marine environments to the deep sea.^{[57][58][59]} Turbidites, which are the sedimentary deposits resulting from turbidity currents, comprise some of the thickest and largest sedimentary sequences on Earth, indicating that the associated erosional processes must also have played a prominent role in Earth's history.

Factors affecting erosion rates

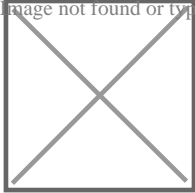
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Climate

[edit]

See also: Climatic geomorphology

The amount and intensity of precipitation is the main climatic factor governing soil erosion by water. The relationship is particularly strong if heavy rainfall occurs at times when, or in locations where, the soil's surface is not well protected by vegetation. This might be during periods when agricultural activities leave the soil bare, or in semi-arid regions where vegetation is naturally sparse. Wind erosion requires strong winds, particularly during times of drought when vegetation is sparse and soil is dry (and so is more erodible). Other climatic factors such as average temperature and temperature range may also affect erosion, via their effects on vegetation and soil properties. In general, given similar vegetation and ecosystems, areas with more precipitation (especially high-intensity rainfall), more wind, or more storms are expected to have more erosion.

In some areas of the world (e.g. the mid-western US), rainfall intensity is the primary determinant of erosivity (for a definition of *erosivity* check,[⁶⁰]) with higher intensity rainfall generally resulting in more soil erosion by water. The size and velocity of rain drops is also an important factor. Larger and higher-velocity rain drops have greater kinetic energy, and thus their impact will displace soil particles by larger distances than smaller, slower-moving rain drops.[⁶¹]

In other regions of the world (e.g. western Europe), runoff and erosion result from relatively low intensities of stratiform rainfall falling onto the previously saturated soil. In such situations, rainfall amount rather than intensity is the main factor determining the severity of soil erosion by water.[¹⁷] According to the climate change projections, erosivity will increase significantly in Europe and soil erosion may increase by 13–22.5% by 2050 [⁶²]

In Taiwan, where typhoon frequency increased significantly in the 21st century, a strong link has been drawn between the increase in storm frequency with an increase in sediment load in rivers and reservoirs, highlighting the impacts climate change can have on erosion.[⁶³]

Vegetative cover

[edit]

See also: Vegetation and slope stability

Vegetation acts as an interface between the atmosphere and the soil. It increases the permeability of the soil to rainwater, thus decreasing runoff. It shelters the soil from winds, which results in decreased wind erosion, as well as advantageous changes in microclimate. The roots of the plants bind the soil together, and interweave with other roots, forming a more solid mass that is less susceptible to both water^[64] and wind erosion. The removal of vegetation increases the rate of surface erosion.^[65]

Topography

[edit]

The topography of the land determines the velocity at which surface runoff will flow, which in turn determines the erosivity of the runoff. Longer, steeper slopes (especially those without adequate vegetative cover) are more susceptible to very high rates of erosion during heavy rains than shorter, less steep slopes. Steeper terrain is also more prone to mudslides, landslides, and other forms of gravitational erosion processes.^[61]

:â€28–30â€^[66] ^[67]

Tectonics

[edit]

Main article: Erosion and tectonics

Tectonic processes control rates and distributions of erosion at the Earth's surface. If the tectonic action causes part of the Earth's surface (e.g., a mountain range) to be raised or lowered relative to surrounding areas, this must necessarily change the gradient of the land surface. Because erosion rates are almost always sensitive to the local slope (see above), this will change the rates of erosion in the uplifted area. Active tectonics also brings fresh, unweathered rock towards the surface, where it is exposed to the action of erosion.

However, erosion can also affect tectonic processes. The removal by erosion of large amounts of rock from a particular region, and its deposition elsewhere, can result in a

lightening of the load on the lower crust and mantle. Because tectonic processes are driven by gradients in the stress field developed in the crust, this unloading can in turn cause tectonic or isostatic uplift in the region.^[51] In some cases, it has been hypothesised that these twin feedbacks can act to localize and enhance zones of very rapid exhumation of deep crustal rocks beneath places on the Earth's surface with extremely high erosion rates, for example, beneath the extremely steep terrain of Nanga Parbat in the western Himalayas. Such a place has been called a "tectonic aneurysm".^[69]

Development

[edit]

Human land development, in forms including agricultural and urban development, is considered a significant factor in erosion and sediment transport, which aggravate food insecurity.^[70] In Taiwan, increases in sediment load in the northern, central, and southern regions of the island can be tracked with the timeline of development for each region throughout the 20th century.^[63] The intentional removal of soil and rock by humans is a form of erosion that has been named *lisasion*.^[71]

Erosion at various scales

[edit]

Mountain ranges

[edit]

See also: denudation and planation

Mountain ranges take millions of years to erode to the degree they effectively cease to exist. Scholars Pitman and Golovchenko estimate that it takes probably more than 450 million years to erode a mountain mass similar to the Himalaya into an almost-flat peneplain if there are no significant sea-level changes.^[72] Erosion of mountains massifs can create a pattern of equally high summits called summit accordance.^[73] It has been argued that extension during post-orogenic collapse is a more effective

mechanism of lowering the height of orogenic mountains than erosion.^[74]

Examples of heavily eroded mountain ranges include the Timanides of Northern Russia. Erosion of this orogen has produced sediments that are now found in the East European Platform, including the Cambrian Sablya Formation near Lake Ladoga. Studies of these sediments indicate that it is likely that the erosion of the orogen began in the Cambrian and then intensified in the Ordovician.^[75]

Soils

[edit]

Further information: soil erosion and pedogenesis

If the erosion rate exceeds soil formation, erosion destroys the soil.^[76] Lower rates of erosion can prevent the formation of soil features that take time to develop. Inceptisols develop on eroded landscapes that, if stable, would have supported the formation of more developed Alfisols.^[77]

While erosion of soils is a natural process, human activities have increased by 10–40 times the rate at which erosion occurs globally. Excessive (or accelerated) erosion causes both "on-site" and "off-site" problems. On-site impacts include decreases in agricultural productivity and (on natural landscapes) ecological collapse, both because of loss of the nutrient-rich upper soil layers. In some cases, the eventual result is desertification. Off-site effects include sedimentation of waterways and eutrophication of water bodies, as well as sediment-related damage to roads and houses. Water and wind erosion are the two primary causes of land degradation; combined, they are responsible for about 84% of the global extent of degraded land, making excessive erosion one of the most significant environmental problems.^{[10][78]}

Often in the United States, farmers cultivating highly erodible land must comply with a conservation plan to be eligible for agricultural assistance.^[79]

Consequences of human-made soil erosion

[edit]

Main articles: Human impact on the environment, Environmental impact of agriculture, Soil retrogression and degradation, and Land degradation

See also

[edit]

- Bridge scour – Erosion of sediment near bridge foundations by water
- Cellular confinement – Confinement system used in construction and geotechnical engineering
- Colluvium – Loose, unconsolidated sediments deposited at the base of a hillslope
- Groundwater sapping
- Lessivage
- Space weathering – Type of weathering
- Vetiver System – System of soil and water conservation

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External links

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Erosion at Wikipedia's sister projects

-  Definitions from Wiktionary
-  Media from Commons
-  News from Wikinews
-  Textbooks from Wikibooks
- The Soil Erosion Site
- International Erosion Control Association
- Soil Erosion Data in the European Soil Portal
- USDA National Soil Erosion Laboratory
- The Soil and Water Conservation Society

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Rivers, streams and springs

**Rivers
(lists)**

- Alluvial river
- Braided river
- Blackwater river
- Channel
- Channel pattern
- Channel types
- Confluence
- Distributary
- Drainage basin
- Subterranean river
- River bifurcation
- River ecosystem
- River source
- Tributary
- Arroyo
- Bourne
- Burn
- Chalk stream
- Coulee
- Current

Streams

- Stream bed
- Stream channel
- Streamflow
- Stream gradient
- Stream pool
- Perennial stream
- Winterbourne

Springs
(list)

- Estavelle/Inversac
- Geyser
- Holy well
- Hot spring
 - list
 - list in the US
- Karst spring
 - list
- Mineral spring
- Ponor
- Rhythmic spring
- Spring horizon

**Sedimentary processes
and erosion**

- Abrasion
- Anabranch
- Aggradation
- Armor
- Bed load
- Bed material load
- Granular flow
- Debris flow
- Deposition
- Dissolved load
- Downcutting
- Erosion
- Headward erosion
- Knickpoint
- Palaeochannel
- Progradation
- Retrogradation
- Saltation
- Secondary flow
- Sediment transport
- Suspended load
- Wash load
- Water gap

Fluvial landforms

- Ait
- Alluvial fan
- Antecedent drainage stream
- Avulsion
- Bank
- Bar
- Bayou
- Billabong
- Canyon
- Chine
- Cut bank
- Estuary
- Floating island
- Fluvial terrace
- Gill
- Gulch
- Gully
- Glen
- Meander scar
- Mouth bar
- Oxbow lake
- Riffle–pool sequence
- Point bar
- Ravine
- Rill
- River island
- Rock–cut basin
- Sedimentary basin
- Sedimentary structures
- Strath
- Thalweg
- River valley
- Wadi

- Helicoidal flow
- International scale of river difficulty
- Log jam
- Meander
- Plunge pool
- Fluvial flow**
 - Rapids
 - Riffle
 - Shoal
 - Stream capture
 - Waterfall
 - Whitewater
- Surface runoff**
 - Agricultural wastewater
 - First flush
 - Urban runoff
 - 100-year flood
 - Crevasse splay
 - Flash flood
 - Flood
 - Urban flooding
 - Non-water flood
 - Flood barrier
- Floods and stormwater**
 - Flood control
 - Flood forecasting
 - Flood-meadow
 - Floodplain
 - Flood pulse concept
 - Flooded grasslands and savannas
 - Inundation
 - Storm Water Management Model
 - Return period
- Point source pollution**
 - Effluent
 - Industrial wastewater
 - Sewage

**River measurement
and modelling**

- Baer's law
- Baseflow
- Bradshaw model
- Discharge (hydrology)
- Drainage density
- Exner equation
- Groundwater model
- Hack's law
- Hjulström curve
- Hydrograph
- Hydrological model
- Hydrological transport model
- Infiltration (hydrology)
- Main stem
- Playfair's law
- Relief ratio
- River Continuum Concept
- Rouse number
- Runoff curve number
- Runoff model (reservoir)
- Stream gauge
- Universal Soil Loss Equation
- WAFLEX
- Wetted perimeter
- Volumetric flow rate

River engineering

- Aqueduct
- Balancing lake
- Canal
- Check dam
- Dam
- Drop structure
- Daylighting
- Detention basin
- Erosion control
- Fish ladder
- Floodplain restoration
- Flume
- Infiltration basin
- Leat
- Levee
- River morphology
- Retention basin
- Revetment
- Riparian-zone restoration
- Stream restoration
- Weir
- Canyoning
- Fly fishing
- Rafting
- River surfing
- Riverboarding
- Stone skipping
- Triathlon
- Whitewater canoeing
- Whitewater kayaking
- Whitewater slalom

River sports

- Aquifer
 - Aquatic toxicology
 - Body of water
 - Hydraulic civilization
 - Limnology
 - Riparian zone
 - River valley civilization
 - River cruise
 - Sacred waters
 - Surface water
 - Wild river
- Related**
- Rivers by length
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 - Countries without rivers

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 - Encyclopedia of Modern Ukraine

About United Structural Systems of Illinois, Inc

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Things To Do in Cook County

Photo

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Margaret T. Burroughs Beach And Park

4.6 (86)

Photo

Glessner House

4.7 (203)

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Pullman National Historical Park

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Skydeck Chicago

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**Pullman National Historical Park Visitor
Center**

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Willis Tower

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Driving Directions in Cook County

**Driving Directions From AMC South Barrington 24 to United Structural Systems of
Illinois, Inc**

**Driving Directions From Hilton Garden Inn Hoffman Estates to United Structural
Systems of Illinois, Inc**

**Driving Directions From Bryan A. Bertoglio, MD to United Structural Systems of
Illinois, Inc**

Driving Directions From Hyatt Place Chicago/Hoffman Estates to United Structural Systems of Illinois, Inc

Driving Directions From Lucky Monk to United Structural Systems of Illinois, Inc

Driving Directions From Country Inn & Suites by Radisson, Hoffman Estates, IL to United Structural Systems of Illinois, Inc

Structural engineer

foundation repair near me

foundation crack repair service

Driving Directions From Chicago's Chinatown Gateway to United Structural Systems of Illinois, Inc

Driving Directions From Margaret T. Burroughs Beach And Park to United Structural Systems of Illinois, Inc

Driving Directions From Glessner House to United Structural Systems of Illinois, Inc

Driving Directions From Jackson (Andrew) Park to United Structural Systems of Illinois, Inc

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foundation repair near me

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Waterproofing service

Concrete contractor

Reviews for United Structural Systems of Illinois, Inc

United Structural Systems of Illinois, Inc

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Chris Abplanalp

(5)

USS did an amazing job on my underpinning on my house, they were also very courteous to the proximity of my property line next to my neighbor. They kept things in order with all the dirt/mud they had to excavate. They were done exactly in the timeframe they indicated, and the contract was very details oriented with drawings of what would be done. Only thing that would have been nice, is they left my concrete a little muddy with boot prints but again, all-in-all a great job

United Structural Systems of Illinois, Inc

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Dave Kari

(5)

What a fantastic experience! Owner Rick Thomas is a trustworthy professional. Nick and the crew are hard working, knowledgeable and experienced. I interviewed every company in the area, big and small. A homeowner never wants to hear that they have foundation issues. Out of every company, I trusted USS the most, and it paid off in the end. Highly recommend.

United Structural Systems of Illinois, Inc

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Jim de Leon

(5)

It was a pleasure to work with Rick and his crew. From the beginning, Rick listened to my concerns and what I wished to accomplish. Out of the 6 contractors that quoted the project, Rick seemed the MOST willing to accommodate my wishes. His pricing was definitely more than fair as well. I had 10 push piers installed to stabilize and lift an addition of my house. The project commenced at the date that Rick had disclosed initially and it was completed within the same time period expected (based on Rick's original assessment). The crew was well informed, courteous, and hard working. They were not loud (even while equipment was being utilized) and were well spoken. My neighbors were very impressed on how polite they were when they entered / exited my property (saying hello or good morning each day when they crossed paths). You can tell they care about the customer concerns. They ensured that the property would be put back as clean as possible by placing MANY sheets of plywood down prior to excavating. They compacted the dirt back in the holes extremely well to avoid large stock piles of soils. All the while, the main office was calling me to discuss updates and expectations of completion. They provided waivers of lien, certificates of insurance, properly acquired permits, and JULIE locates. From a construction background, I can tell you that I did not see any flaws in the way they operated and this an extremely professional company. The pictures attached show the push piers added to the foundation (pictures 1, 2 & 3), the amount of excavation (picture 4), and the restoration after dirt was placed back in the pits and compacted (pictures 5, 6 & 7). Please notice that they also sealed two large cracks and steel plated these cracks from expanding further (which you can see under my sliding glass door). I, as well as my wife, are extremely happy that we chose United Structural Systems for our contractor. I would happily tell any of my friends and family to use this contractor should the opportunity arise!

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Paul Gunderlock

(4)

The staff was helpful, very nice and easy to work with and completed the work timely and cleaned up well. Communications faltered a bit at times and there was an email communications glitch which was no fault of anyone, but no big deal and all ended up fine. We sure feel better to have this done and hope that is the end of our structural issues. It does seem like (after talking to several related companies), that it would be great if some of these related companies had a structural engineer on staff vs using on the job expertise gained over years - which is definitely valuable! But leaves a bit of uncertainty - and probably saves money for both sides may be the trade-off? So far, so good though! Thank you.

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Sarah McNeily

(5)

USS was excellent. They are honest, straightforward, trustworthy, and conscientious. They thoughtfully removed the flowers and flower bulbs to dig where they needed in the yard, replanted said flowers and spread the extra dirt to fill in an area of the yard. We've had other services from different companies and our yard was really a mess after. They kept the job site meticulously clean. The crew was on time and friendly. I'd recommend them any day! Thanks to Jessie and crew.

Tracking Subtle Changes in Fracture Patterns [View GBP](#)

Check our other pages :

- [Differentiating Structural Fractures From Cosmetic Blemishes](#)
- [Evaluating Temperature Fluctuations and Their Impact on Slab Integrity](#)
- [Interpreting Hidden Cracks in Finished Basements](#)
- [Identifying Crumbling Areas in Older Homes](#)

Frequently Asked Questions

How can I detect subtle changes in fracture patterns in my foundation?

Subtle changes can be detected using tools like digital crack monitors, time-lapse photography, or laser scanning technology. Regular visual inspections and noting any changes over time can also help.

Why is it important to track these subtle changes before proceeding with repairs?

Tracking these changes helps identify the root cause of the problem, assess the progression of damage, and determine the most effective repair method to prevent further structural issues.

What technologies or methods are commonly used for accurate tracking?

Common methods include electronic monitoring systems, ultrasonic testing, and 3D imaging techniques. These provide precise measurements and data on crack development over time.

Can environmental factors influence fracture patterns in foundations?

Yes, factors such as soil moisture levels, temperature fluctuations, seismic activity, and nearby construction can affect how cracks develop or change over time.

How often should I monitor fracture patterns once they are identified?

Its recommended to conduct regular monitoring every few months or more frequently if significant movement is detected. This depends on the severity of the initial findings and environmental conditions.

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