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Sustainable Urban Rehabilitation in Europe

Methodological approach to conservation

Erasmus+

Sustainable Urban Rehabilitation in Europe

3rd Semester

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Methodological Approach to Conservation: Physical Approach

2 ECTS

SH
Sustainable Heritage

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SURE
SUSTAINABLE URBAN REHABILITATION IN EUROPE

UNIVERSIDAD POLITÉCNICA DE MADRID

Sustainable Urban Rehabilitation in Europe

Methodological Approach to Conservation: Physical Approach

1. Introduction to Methodological Approach
2. Geometrical Survey
3. Geometrical Survey: traditional method
4. Geometrical Survey: new tools
5. Material Survey.
6. Mechanical Survey.
7. Damage maps I: degradation problems
8. **Degradation types.**
9. Damage maps II: fissure and crack problems
10. Damage maps III: moisture problems
11. Damage tests on masonry constructions I
12. Damage tests on masonry constructions II
13. Survey, maps and tests on wooden contruction.
14. Archaeology.
15. Stratigraphy.

Methodological Approach to Conservation: Physical Approach

LESSON 08. DEGRADATION PROBLEMS

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SURE
SUSTAINABLE URBAN REHABILITATION IN EUROPE

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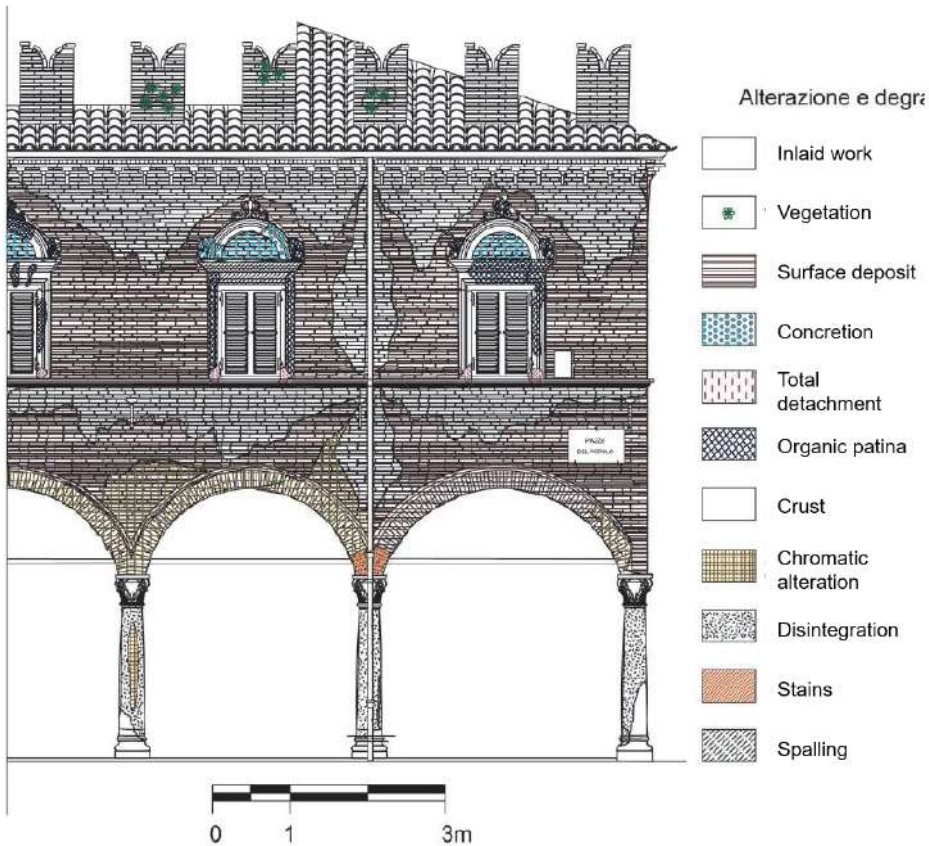
MAP OF DAMAGES: DEGRADATION SURVEY

Definition.

The survey and the representation of the degradation of the materials are usually made using as a basis cartographic architectural survey, on which, using synthetic abstract symbologies, it is portrayed the perimeter of the areas subject some typical aspects of degradation, such as surface deposit , cracking, cracking, fracturing, scaling, alveolization, black crusts, pitting, corrosion, spotting, efflorescence, detachment, etc.



Maps of damage. Alterations and degradations

ALTERATION
Modification of the material that does not necessary imply a worsening of its characteristics from the point of view of conservation. For instance, a reversible coating applied on a stone may be considered as an alteration.

DAMAGE
Human perception of the loss of value due to decay.

DECAY
Any chemical or physical modification of the intrinsic stone properties leading to a loss of value or to the impairment of use.

DEGRADATION
Decline in condition, quality, or functional capacity.

DETERIORATION
Process of making or becoming worse or lower in quality, value, character, etc...; depreciation.

WEATHERING
Any chemical or mechanical process by which stones exposed to the weather undergo changes in character and deteriorate.

ALTERATION

DEGRADATION

DAMAGE

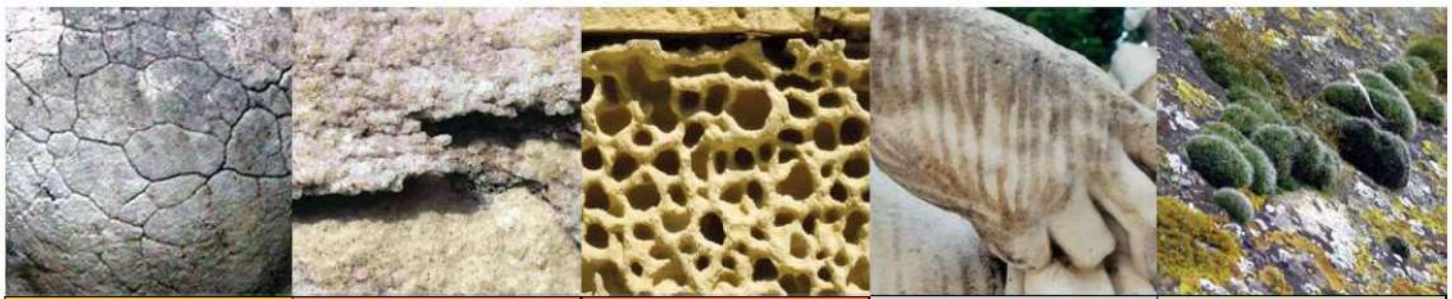
DETERIORATION

DECAY

WEATHERING

Glosario ICOMOS

The glossary is arranged into 6 families composed of 2 to 11 terms :



Crack & Deformation	Detachment	Material Loss	Discoloration & Deposit	Biological Colonization
• Crack • Deformation	• blistering • bursting • delamination • disintegration • fragmentation • peeling • scaling	• alveolization • erosion • mech.damage • missing part • perforation	• crust • deposit • discoloration • efflorescence • encrustation • film • glossy aspect • film • patina • soiling	• alga • lichen • moss • mould • plant

MAP OF DAMAGES: DEGRADATION TYPOLOGIES

Crack & deformation

FRACTURING OR FIXING / Fracturazione o fessurazione

Degradation that manifests itself with the formation of continuity solutions in the material and which may involve the reciprocal displacement of the parts.

DEFORMATION / Deformazione

Variation of the shape that affects the entire thickness of the material and which manifests itself mainly in sheet-like elements.

MAP OF DAMAGES: DEGRADATION TYPOLOGIES

Detachment

BLISTERING / Rigonfiamento

Separated, air-filled, raised hemispherical elevationson the face of stone resulting from the detachmentof an outer stone layer. This detachment is not related to the stone structure. Blistering, in some circumstances, is caused by soluble salts action.

BURSTING

Local loss of the stone surface from internal pressu-re usually manifesting in the form of an irregularly-sided crater. Bursting is sometimes preceded by star-shaped face-fracturing.

MAP OF DAMAGES: DEGRADATION TYPOLOGIES

Detachment

DELAMINATION / Esfoliazione

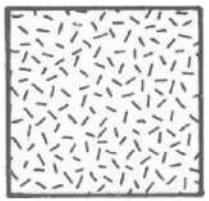
Detachment process affecting laminated stones(some sedimentary and metamorphic rocks). It corresponds to a physical separation into layers following the stone laminae. The thickness and the shape of the layers are varia-ble. The layers may be oriented in any direction with regards to the stone surface.

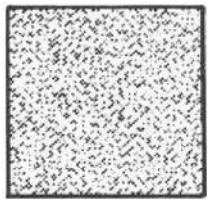
SCALING / Scagliatura

Detachment of stone as a scale or a stack of scales, not following any stone structure and detaching like fish scales or parallel to the stone surface. The thickness of a scale is generally of millimetric to centimetric scale, and is negligeable compared to its surface dimension.

MAP OF DAMAGES: DEGRADATION TYPOLOGIES

Detachment





DISINTEGRATION / Disgragazione

POWDERING, CHALKING / Pulverizzazione

It affects only the surface of the stone or can occur in depth. Damage generally starts from the surface of the material.

-Crumbling :Detachment of aggregates of grains from the substrate. These aggregates are generally limited in size (less than 2 cm). This size depends of the nature of the stone andits environment.

-Granular disintegration :Occurs in granular sedimentary (e.g. sandstone) and granular crystalline (e.g. granite) stones. Granular disintegration produces debris referred to as a rock meal and can often be seen accumulating at the foot of wall actively deteriorating. The following specific terms, refer either to the size, or to the aspect of corresponding grains :

•Powdering, Chalking :terms sometimes employed fordescribing granular disintegration of finely grained stones.

•Sugaring :employed mainly for white cristallyne marble,

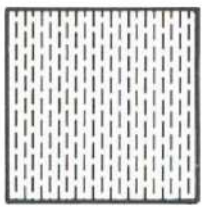
•Sanding :used to describe granular disintegration of sandstones and granites.

MAP OF DAMAGES: DEGRADATION TYPOLOGIES

Detachment

FRAGMENTATION / Fracturazione

The complete or partial breaking up of a stone, into portions of variable dimensions that are irregular in form, thickness and volume.



PEELING / Distacco

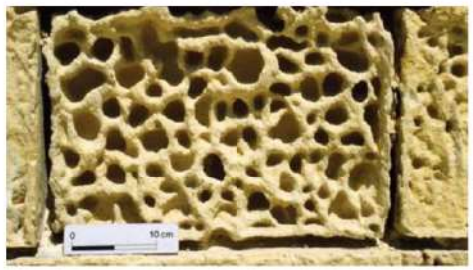
Shedding, coming off, or partial detachment of a superficial layer (thickness : submillimetric to millimetric) having the aspect of a film or coating which has been applied on the stone surface.

MAP OF DAMAGES: DEGRADATION TYPOLOGIES

Material Loss

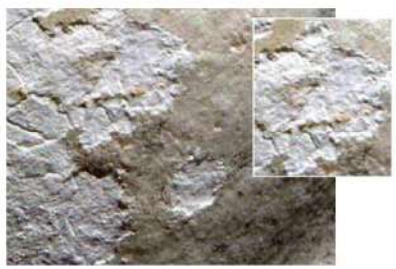
ALVEOLIZATION / Alveolizzacione

Degradation that manifests itself with the formation of cavities of variable shape and size. Alveoli are often interconnected and have non-uniform distribution. In the particular case in which the phenomenon develops essentially in depth with a diverticula course, the term carotene alveolization can be used.



EROSION / Erosione

Loss of original surface, leading to smoothed shapes. Erosion may have natural and/or anthropogenic causes. It can be due to chemical, physical or/and biological processes.



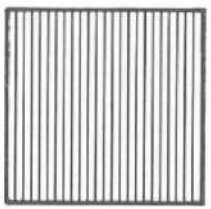
MAP OF DAMAGES: DEGRADATION TYPOLOGIES

Material Loss

MECHANICAL DAMAGE

Loss of stone material clearly due to a mechanical action.

- Impact damage: Mechanical damage due to the impact of a projectile
- Cut : Loss of material due to the action of an edge tool.
- Scratch: Line-like loss of material due to the action of some pointed object.
- Abrasion : Erosion due to the rubbing away by means of friction.
- Keying : Impact damage resulting from hitting a surface with a pointed tool.

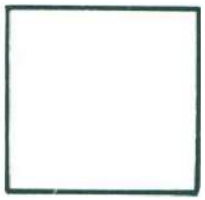


MISSING PART / Mancanza

Empty space, obviously located in the place of some formerly existing stone part. Protruding and particularly exposed parts of sculptures (nose, fingers..) are typical locations for material loss resulting in missing parts.

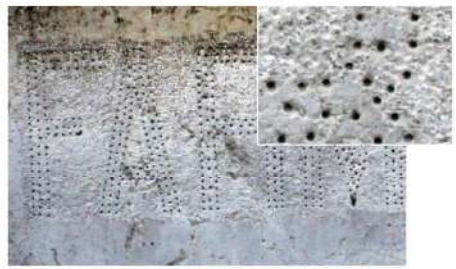
MAP OF DAMAGES: DEGRADATION TYPOLOGIES

Material Loss



PERFORATION

A single or series of surface punctures, holes or gaps, made by a sharp tool or created by an animal. The size is generally of millimetric to centimetric scale. Perforations are deeper than wide, and penetrate into the body of the stone.



MAP OF DAMAGES: DEGRADATION TYPOLOGIES

Discoloration & Deposit

PITTING / Pitting

Point-like millimetric or submillimetric shallow cavities. The pits generally have a cylindrical or conical shape and are not interconnected, although transitions patterns to interconnected pits can also be observed.

CRUST / Crosta

Generally coherent accumulation of materials on the surface. It may include exogenic deposits in combination with materials derived from the stone. A crust is frequently dark coloured (black crust). Crusts may have an homogeneous thickness, or have irregular thickness.

MAP OF DAMAGES: DEGRADATION TYPOLOGIES

Discoloration & Deposit

DEPOSIT / Deposito superficiale

Accumulation of exogenic material of variable thickness. Some examples of deposits : splashes of paint or mortar, sea salt aerosols, atmospheric particles such as soot or dust, remains of conservation materials such as cellulose poultices, blast materials etc...

DISCOLORATION / Alterazione cromatica

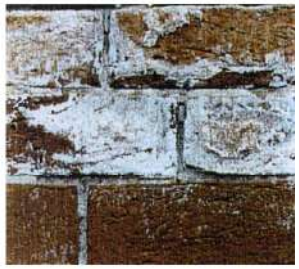
Alteration that manifests itself through the variation of one or more parameters that define the color: tint (hue), clarity (value), saturation. It can occur with different morphologies and can refer to large or localized areas.

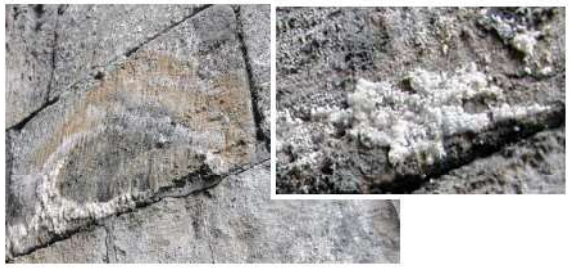
MAP OF DAMAGES: DEGRADATION TYPOLOGIES

Discoloration & Deposit

EFLORESCENCE / Efflorencensa

Generally whitish, powdery or whisker-like crystals on the surface. Efflorescences are generally poorly cohesive and commonly made of soluble salt crystals.





ENCROSTATION / Incrostazione

Compact, hard, mineral outer layer adhering to the stone. Surface morphology and colour are usually different from those of the stone..

MAP OF DAMAGES: DEGRADATION TYPOLOGIES

Discoloration & Deposit

FILM / Pellicola

Thin covering or coating layer generally of organic nature, generally homogeneous, follows the stone surface. A film may be opaque or translucent.

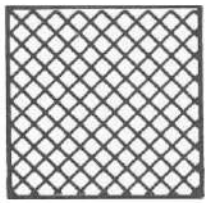

GLOSSY ASPECT

Aspect of a surface that reflects totally or partially the light, it has a mirror-like appearance. A glossy aspect may be due to previous polishing, intentional or not), or to the presence of a transparent film which reflects light.



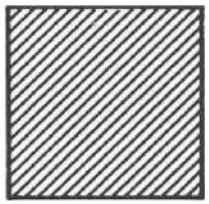

MAP OF DAMAGES: DEGRADATION TYPOLOGIES

Discoloration & Deposit



PATINA / Patina

Chromatic modification of the material, generally resulting from natural or artificial ageing and not involving in most cases visible surface deterioration.



SOILING / Macchia

Deposit of a very thin layer of exogenous particles (eg. soot) giving a dirty appearance to the stone surface. With soiling, the substrate stucture is not considered as affected. Soiling may have different degrees of adhesion to the substrate.

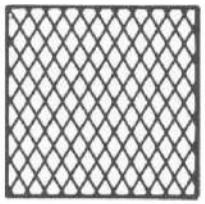
MAP OF DAMAGES: DEGRADATION TYPOLOGIES

Biological colonization

BIOLOGICAL COLONIZATION / Presenza di vegetazione

Colonization of the stone by plants and micro-organisms such as bacteria, cyanobacteria, algae, fungi and lichen. Biological colonization also includes influences by other organisms such as animals nesting on and in stone.





ALGA / Biological patina

Algae are microscopic vegetal organisms without stem nor leaves which can be seen outdoors and indoors, as powdery or viscous deposits. Algae form green, red, brown, or black veil like zones and can be found mainly in situations where the substrate remains moistened for long periods of time.



MAP OF DAMAGES: DEGRADATION TYPOLOGIES

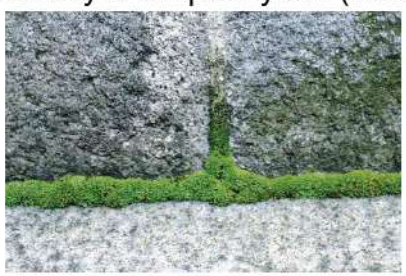
Biological colonization

LICHEN

Vegetal organism forming rounded millimetric to centimetric crusty or bushy patches, often having a leathery appearance, growing generally on outside parts of a building. Lichen are most commonly grey, yellow, orange, green or black and show no differentiation into stem, root and leaf.

MOSS

Vegetal organism forming small, soft and green cushions of centimetric size. Mosses look generally like dense micro-leaves tightly packed together. Mosses often grow on stone surface open cavities, cracks, and in any place permanently or frequently wet (masonry joints), and usually shady.



MAP OF DAMAGES: DEGRADATION TYPOLOGIES

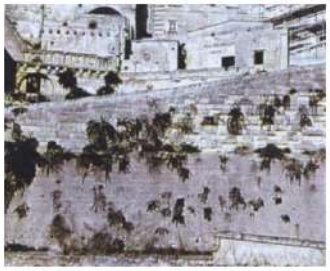
Biological colonization

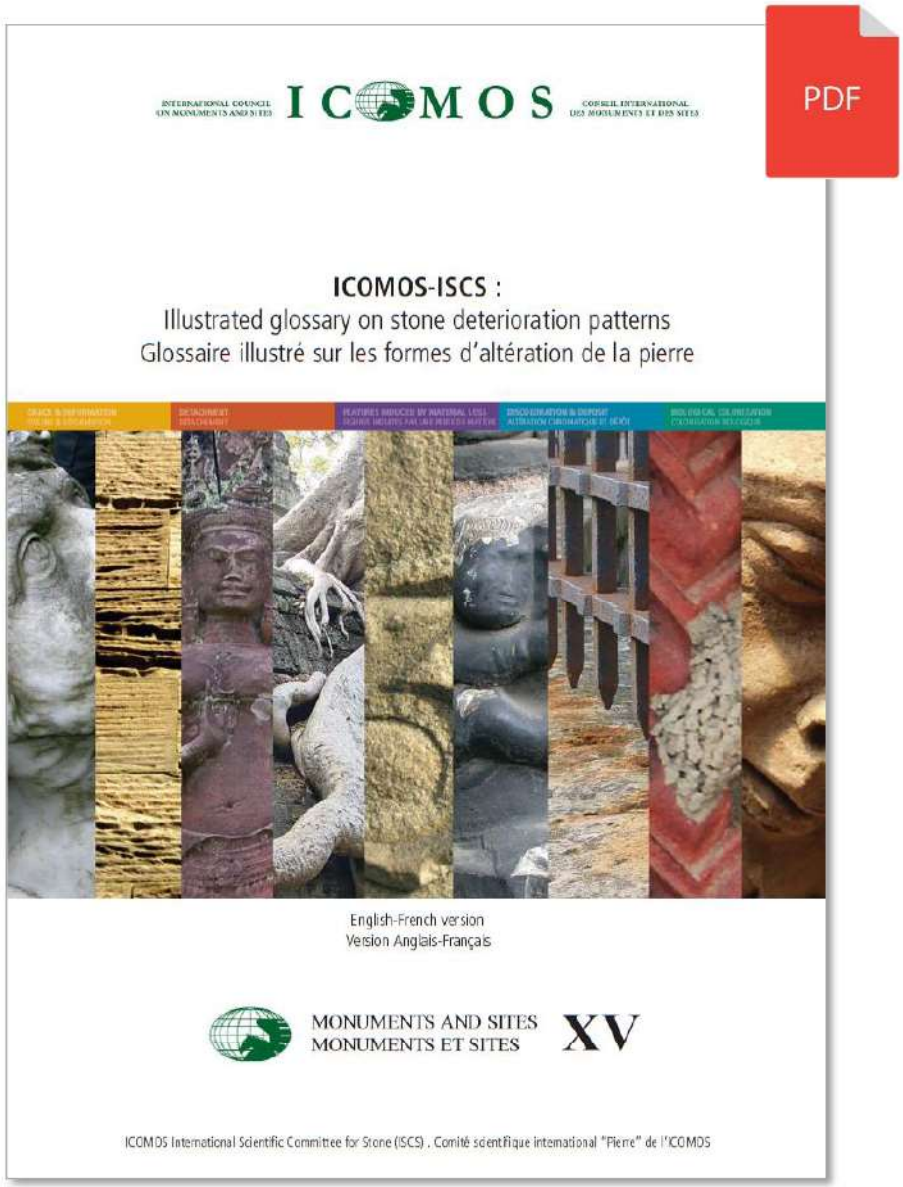
MOULD

Microscopic fungus which colonies, to the naked eye, look like a downy film or a network or star-like millimetric patches of filaments of diverse colours (white, grey, black).

PLANT

Vegetal living being, having, when complete, root, stem, and leaves, though consisting sometimes only of a single leafy expansion (e.g. Tree, fern, herb).





https://www.icomos.org/publications/monuments_and_sites/15/pdf/Monuments_and_Sites_15_ISCS_Glossary_Stone.pdf

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