

# AERIAL PHOTO

Also known as remote-sensing photography

Taking image of the Earth from the elevated position or from the air

Records the ever-changing cultural and natural features on the Earth's surface.

Can be done using satellite, planes, drones



**1827**

Heliography technique



1st ever photo, taken by Joseph Nicéphore Niepce

**1858 - 1914**

Balloons & Kites



Captive Airships

Gaspard Felix Nadar

**1903**

Camera mounted on pigeon patented



invention of rolled paper film

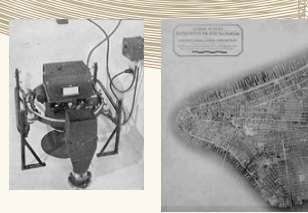
Maul Camera Rocket



WW1 for aerial reconnaissance

**1920 - 1939**

Fairchild's aerial camera system



**1956**

U2 spy planes



**1957**

Sputnik 1 - artificial satellite



**1960**

TIROS -1 Spacecraft



**1965**

Landsat-1



Introduced remote sensing

New Discovery

War/ Military Appliance

Resource Planning & Management

# FUNCTION

Aerial photo is useful in landscape design such as inventory stage. The functions of aerial photo including:

Precision agriculture & rangeland monitoring

- Landcover mapping & classification
- Crop health monitoring
- Modeling biophysical attributes
- Studying soil characteristic

Natural disaster management

- Thermal disasters
- Ground displacement
- Flood

Aquatic ecosystem management

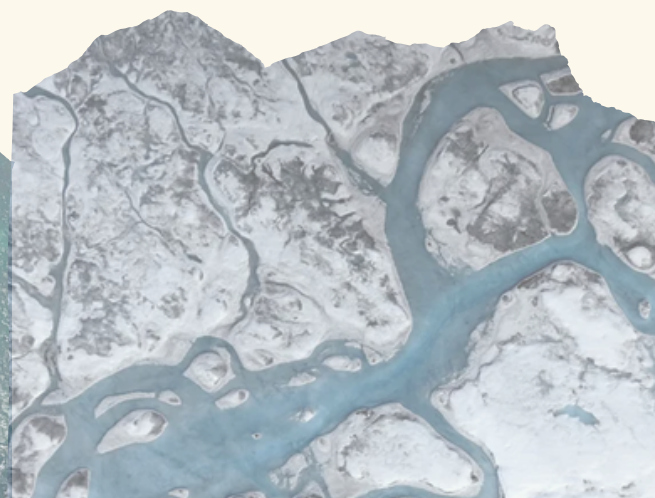
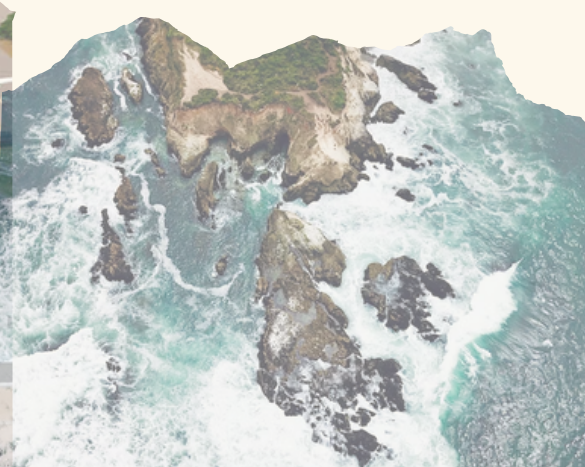
- Mapping & Monitoring
- Characterizing water bodies

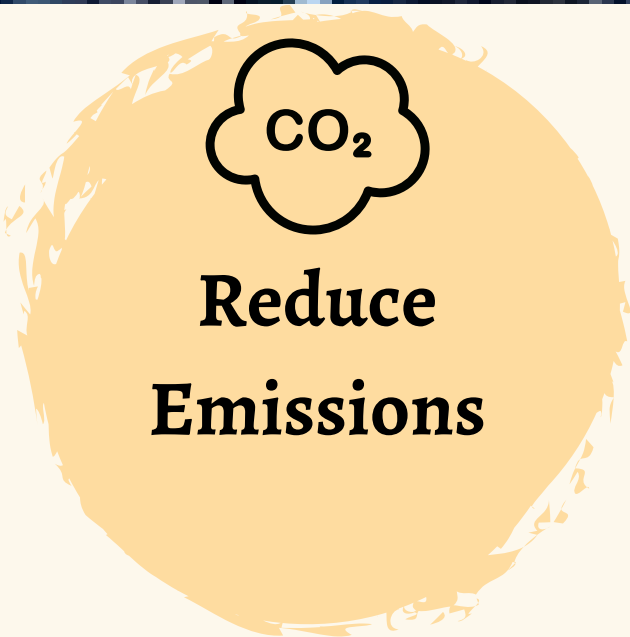
Polar remote sensing

- Mapping of ice cover, permafrost patterns, periglacial processes, vegetation

Wildlife research

- Bird & mammal detection





## Reduce Emissions

- Can remote access easily without travel and visit to the site face to face.
- Use less CO2 compared to the vehicles

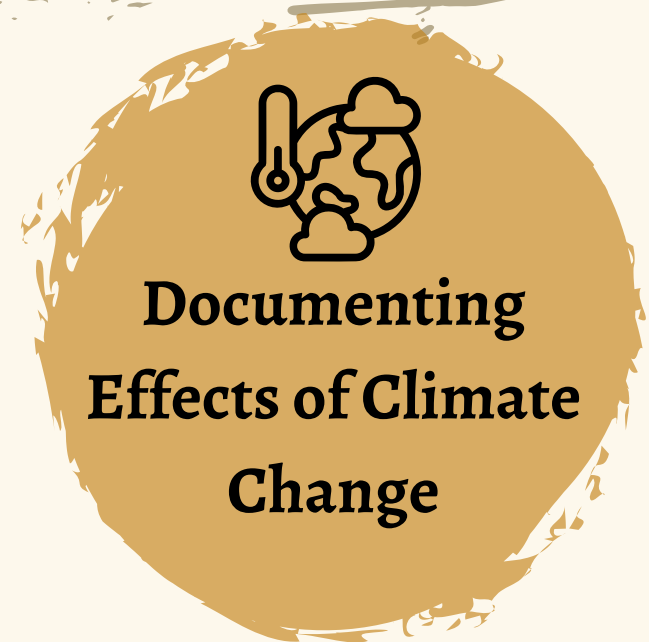


## Protect Natural Resources

- Provide detailed imagery for further preservation plan.
- Helps the planner to get the information using the most effective ways
- Able to do site inventory as well as in the condition of low risk.



# ROLES



## Documenting Effects of Climate Change

- Climate change is happened in a slow time scale
- Give a more accurate perspective to understand about climate change by visual photography.
- Easy for comparison, can notice the disaster or the weakness of the site

# Types of Aerial Photography



- Use airborne camera with sensitive silver halide crystals on backing material & a series of emulsions
- Types of camera: film-based and digital cameras
- **film-based:** with lenses of high geometric quality to minimize distortion
- film-based is finer than digital-camera









- With the aid of digital apps such as GIS
- Convert film-based photographs into digital format through scanning
- **challenge:**
  - high cost
  - a potential loss of radiometric or tonal variation and spatial resolution from the photograph
  - Cannot show the accurate detail photograph

## Primary Aerial Photograph Characteristics





1. **tone or color:** the relative brightness of hue of patches.
2. **shape:** the manner which related groups of pixels are arranged; the complexity of a feature or patch border.
3. **size:** the number of pixels that aggregate to form a group of pixels with similar characteristics.
4. **pattern:** the spatial arrangement and repetition of features (group of pixels) across an area.
5. **texture:** the frequency of change in tone among pixels: smoothness or roughness.
6. **shadows:** the combination of dark or "shadow" pixels adjacent to brighter pixels.
7. **Local characteristics:** condition at the feature or patch level.
8. **Landscape context:** Conditions adjacent to or surrounding a feature or patch.

## Advantages


-  Safe (surveillance and fire-fighting schemes)
-  Cost-effective
-  Capacity to follow track lines more accurately
-  Record and do documentary for landscape changes
-  Obtain fine-scale landscape easily
-  high spatial resolution

## Challenges

### Depends on humans:

-  Different of technique using aerial photography based on personal experience.
-  Uncontrol human's interpretation due to different opinions.
-  Lack of well-trained interpreters.
-  Limited or inconsistent metadata such as historic photo-graph.

### Depends on nature:

-  unable to deal with uncertain conditions (eg. gusty winds, smoke haze)

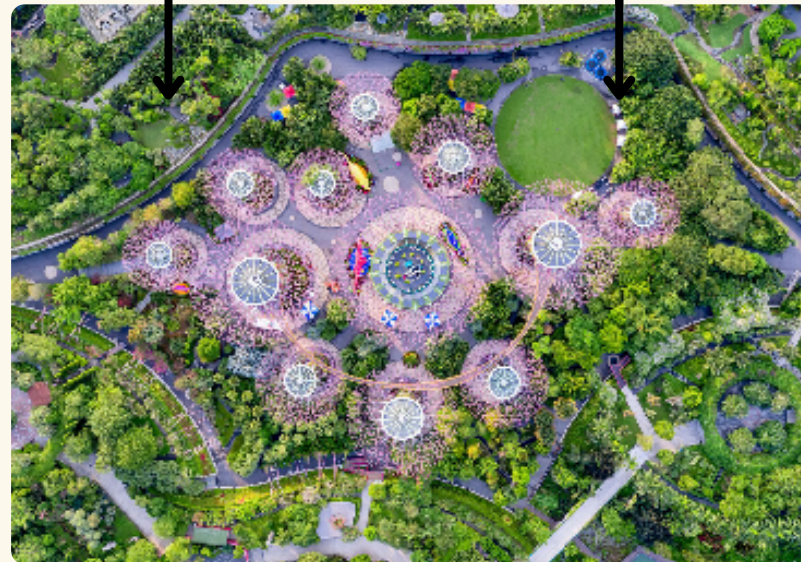
## Examples

- Aerial photography can be taken from **plan view** or **different perspectives** that cannot be obtained from shooting on the ground.

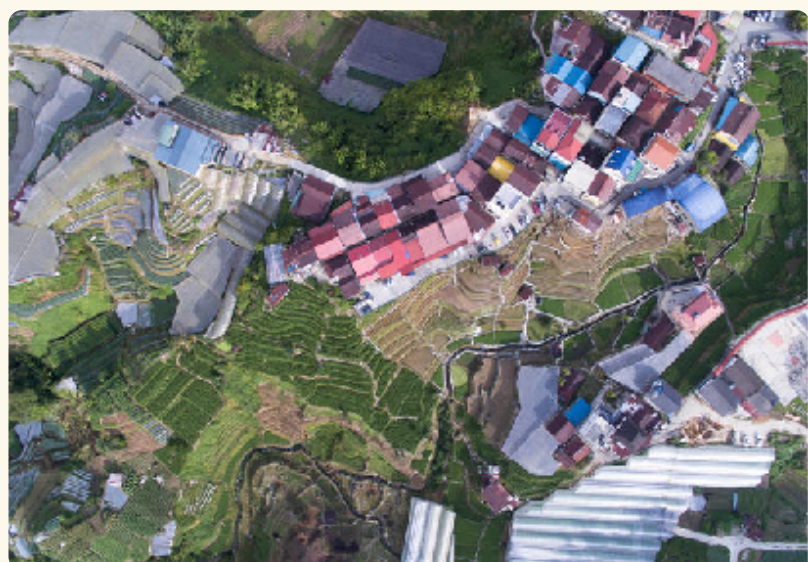
- Super Tree Grove, Singapore



Natural resource      Cultural resource



### Cultural landscape



- Cameron Highlands, Pahang



- Paddy fields, Kuala Selangor

### Natural landscape



- Gunung Mulu National Park, Sarawak



- Kinabatangan River, Sabah

## References

- Jessica L. Morgan, Sarah E. Gergel, Nicholas C. Coops (2023), Aerial Photography: A Rapidly Evolving Tool for Ecological Mangement
- Wikipedia, "Aerial Photography"
- Government of Canada, 2022-04-25, "About Aerial Photography"
- Government of Canada, 2016-09-01, "Concepts of Aerial Photography"
- Government of Canada, 2016-11-17, "Introduction to Aerial Photo Interpretation"
- Ronald J. Hall, January 2003, "The Roles of Aerial Photographs in Forestry Remote Sensing Image Analysis"
- Abigail Bevan & Jack Bolton, 2023, "Landscape Aerial View in Malaysia"
- Priya Thakur Holidify, "nice landscape aerial view"