Introduction to Archaeology: Notes 4

Finding sites: survey, sampling, and settlement patterns

- What's an **archaeological site**?
  - variation on Kelly & Thomas: A place with material evidence exists of human activity
    - usually a concentration of such evidence
  - Yes, but I would add…
    - usually surrounded by space without such evidence
  - that is, a site would be
    - a village, not a house within a village
    - a cemetery, not a particular burial within a cemetery
  - but the term can be defined differently for different purposes
    - Kelly & Thomas warn that "sites" are often collections of artifacts that have accumulated or been exposed for complex reasons, not necessarily "villages" or "camps"
    - this reflects the kinds of cultures they have studied
    - archaeologists who study complex societies find the concept of a "site" less problematic
- How do we find sites?
  - Many were never lost
    - Rome, Great pyramids at Giza, Stonehenge, etc.
  - archaeologists usually find or confirm sites by recognizing artifacts on the surface
    - sometimes walls, foundations, or mounds of accumulated debris are visible
    - sometimes the landform itself: patterns of flat areas
    - more often, bits of broken pottery or stone tools are scattered on the surface
      - **Potsherd**, **sherd**: piece of broken pottery
        - note: very few archaeologists say "shard"
      - **Midden**: food garbage, usually with charcoal, bone, plant material, etc.
      - **Shell midden**: food garbage with shell
    - more details on this later…
  - air photos
    - may show subtle patterns in relief
    - soil color
    - plant growth, etc.
  - satellite photos, now including Google Earth
    - also government and private sources, but less and less needed
    - like air photos: relief, soil color, vegetation clues
  - asking the local people
    - they often know where they have found artifacts while plowing fields, digging wells, etc.
    - they may have oral traditions of where events occurred in the distant past
  - old maps and documents
  - placenames
  - accidental discovery
    - such as when a bulldozer working on a construction project plows up some artifacts

- very common; many important sites have been found this way
- **Preliminary** or **reconnaissance** survey
  - unsystematic checking
    - visiting known sites
    - hiking to places that seem suitable for sites
    - walking around to see what is there, sometimes days or weeks of exploration
    - taking notes, photos, recording locations of sites
  - to get an idea of what sorts of sites are there
  - roughly how common or numerous they are
  - what kinds of evidence are visible on the surface
  - what time periods are suggested by the pottery, stone tools, etc.
  - helps to decide whether it is worth looking more carefully
  - helps to design a more thorough survey that is suited to the region and kinds of sites there
- The most thorough method is **systematic site survey**
  - walking in an orderly pattern back and forth across the landscape and recording all artifacts that are laying on the ground
  - Systematic survey is slow and expensive
    - but unlike the other methods, it can give you a more complete, relatively unbiased picture of the distribution of sites in the whole region
      - not just the places that happen to have standing architecture, be remembered, have been discovered accidentally, etc.

- Systematic site survey produces maps
  - Showing locations of sites, size, period when occupied, etc.
  - this allows us to see the **settlement pattern**: the pattern of distribution of sites of different types across the landscape, and their relationships to natural resources and each other
    - more on this later
  - The settlement pattern of a given region and time can tell us a lot about the culture that produced it - often things that would be difficult or impossible to learn from excavating a single site
    - for example, the **settlement system** of a past society: how people moved through and used a region
    - seasonal rounds? permanent bases with outlying temporary camps? farmland versus pastureland? etc.
  - simply finding surface evidence of sites, recording where they are and what is on the surface, can provide a huge amount of information for much less effort and cost than excavation

- Systematic survey methods
  - line of archaeologists walking across the countryside, looking at the ground
    - a common method: 4 to 8 or 10 crew members stand in a row, separated by a set spacing like 5 meters
    - they walk 4 abreast (or 8, 10, etc.) in a straight line
    - each scanning the ground ahead of them and up to about two meters on either side
    - spacing within the line and between passes determines the largest possible site that could be missed

- the whole line stops if anyone sees any archaeological material, and helps to record the site
- then the crew continues walking, covering a wide strip of landscape
- when they reach the edge of the survey region, they turn around and return along a parallel path, scanning another strip of land

- collect standardized information about each place where any evidence is found
  - field forms
    - location, site number or name, how to find it if necessary
    - description of sherds, lithics, walls, etc. found
    - size of surface scatter of artifacts; map of the area covered or any architecture
    - description of the place: location, topography, ecology, access to water, travel routes, view, etc.
  - **surface collections**
    - **grab sample**: purposefully collected items that seem interesting or diagnostic
    - **systematic sample**: collection made by systematic rules. For example:
      - Draw a 2 meter diameter circle on the surface near the center of the scatter, using two large nails tied together by a 1 meter string
      - Pick up every sherd within the circle that is larger than 3/4" square
      - and/or every stone tool or flake of stone tool material larger than 1/2" square; or whatever
      - These are taken back to the lab, categorized, cataloged, and used to date and otherwise characterize the site
    - this data will suggest
      - when the sites were occupied
      - by what cultural group
      - possibly what activities were done there
- in some environments where you can't see the ground due to plant cover or where floods or other processes have buried the ancient land surface and the artifacts on it, it may be necessary to do:
  - periodic **shovel tests**, **post-hole samples**, or **auger samples**
  - periodic clearing using a machete, etc.
  - “ditch witch” trenching for long, continuous, narrow sampling
  - this is VERY slow and expensive to do over a whole landscape

- **100% coverage** (or **"full coverage"**) **survey**
  - Survey every square meter of the landscape
  - this is necessary in order to find all the sites
  - sometimes that is important
    - for site conservation and management
    - to get the best possible picture of the evidence
    - the only way to be fairly sure that your reconstruction is not missing an unusual but important type or location of site
      - if you only surveyed part of the county, you might miss the one parish church, and think there were no churches there
    - also the only way to be fairly sure about what is NOT there

- if you surveyed half the county without finding a church, you could not be sure that there were no churches; only that they were not very common

- **Sampling strategies**
  - if it would be too slow or expensive to cover the whole landscape, some kinds of questions can be answered by studying just a sample of the area
    - like a series of 100 x 100 meter areas scattered across the landscape
    - this could help with questions like:
      - what is the general density of different kinds of sites?
      - what are the common kinds of sites, and what are the rare ones?
      - what kinds of areas are sites typically found in?
        - near lakes, on hilltops, or in meadows?
        - this could tell you a lot about the subsistence practices of the people who lived at the sites
        - or their need for defense, etc.
      - are certain kinds of sites found only in certain parts of the region?
        - did the red-pottery people live to the south and the white-pottery people to the north, or were both types of pottery used throughout the whole region?
        - this could tell you about ethnic groups, political relations, economic activities, etc.
  - **judgement samples**
    - sample areas are chosen to test areas of interest
    - like: one area on the shore of each lake; one on each hilltop; etc.
    - this may introduce biases into the data
      - sites in areas that the investigator does not think are worth checking will never be found - his assumption will never be disproved
      - the resulting data does not accurately represent the region as a whole
        - you couldn't say things like "there are 2 sites per square kilometer", because you have only looked in certain places; who knows what the site density is in other places?
  - **systematic samples**
    - sample areas are selected in some regular pattern
    - like 100 x 100 meter square areas arranged in a 1000 meter grid
      - this would be a 1% sample of the area
      - probably a bit small for most purposes, but a start
    - this is less biased, but could still have problems.
      - say sites tended to be about a kilometer apart.
      - with luck, you might hit every site, and think the site density was very high
      - or the sample areas might fall in between them, and you would think the site density was very low
  - **random sampling**
    - sample areas are selected using a random number table, random number generator on a computer or calculator, etc.
    - does not introduce any systematic biases into the data
    - all parts of the region are equally likely to be sampled
    - spatial patterning of site locations will not affect how likely sites are to be found

- the final data is a fair representation of the whole region

- **stratified random sampling**
  - but why waste lots of time looking in the unlikely areas where you never find anything?
  - or why risk missing certain parts of the region completely?
    - say only 0.1% of the region is riverbanks, but you think people probably liked to live along riverbanks
    - a random 5% sample might well not include a single survey area that falls on a riverbank
  - solution: stratified random sampling
    - divide up the region into a few kinds of terrain, like "exposed bedrock", "hillsides", and "riverbanks"
    - these are the "sampling strata"
  - then do a random sample within each stratum
    - this assures that you cover some of each
    - you can even do a higher percentage sample in the more promising areas
      - say, just 1% coverage of the exposed bedrock areas
      - but 10% coverage of the riverbank areas
  - this gives you a truly representative, unbiased sample of each kind of area
  - you can extrapolate this to the entire area by multiplying by the area of each stratum
    - say you find 0.1 site per square kilometer in the exposed bedrock sampling stratum
    - 1 site per square kilometer in the hillside stratum
    - 10 sites per square kilometer in the riverbank stratum
    - to estimate the total number of sites in the region, you use a map to measure how many km^2 each stratum occupies
      - then multiply the site density in each by the area of each
    - this gives you an unbiased estimate for the whole region without having to cover too much exposed bedrock…
- **transects**
  - but random sampling areas are often hard to get to; they require lots of wasted travel time
  - alternative: transects
    - transects are sampling units in the form of long strips
    - the strips typically cross a variety of terrain types
    - so they tend to give a fairly representative sample of the landscape
    - but they are easier to cover without a lot of wasted travel time
    - transects are not really random and unbiased, but they are a fair approximation
- these same sampling strategies will be useful in laying out surface collection units on large sites, selecting spots to excavate, etc.
- problems with sampling:
  - by definition, you only get data about part of the area
    - most of the area is never covered
  - so, rare or unique types of sites can easily be missed
    - if you did a random sample survey of lower Egypt, odds are high that you would miss the great pyramids… and that would certainly mess up your conclusions.

- also, you don't get the whole pattern, just little pieces of it
  - so a sampling scheme would tend to hide spatial patterns like:
  - sites were located in lines along rows or canals
  - sites arranged with a few large sites, each surrounded by a halo of small sites
  - patterns like these could be very useful for reconstructing social organization - but sampling techniques rarely reveal them

- **Settlement pattern analysis**
  - generally works best with 100% coverage, so patterns can be seen
  - **Gross patterning**: what kinds of sites are where?
    - are there sub-regions associated with different kinds of sites (farming villages vs. hunting camps; different ethnic groups, etc.)?
    - did the preferred locations of sites shift over time?
      - due to changing environment? economic specializations like fishing vs. farming? building of canals? etc.
    - did overall population rise, fall, or remain constant?
    - are sites associated with certain artificial features, like roads or canals?
      - this can help to date otherwise enigmatic features
      - and to suggest what they were for
    - this level of settlement pattern analysis can often work with sampled data
  - **Catchment analysis**: what resources were sites located near?
    - simply draw a circle of "x" km radius around each site on a map that shows ecological zones or other distributions of resources
      - measure the area of each kind of resource zone within the given distance from the site
      - this gives a rough idea of what resources were probably important to the people at the site
      - slightly better way:
        - draw the boundaries according to walking time, rather than simple distance
        - some terrain may be harder to cross, or there may be natural barriers like rivers or cliffs
    - what if the circles intersect (as they probably will, unless the region is seriously underpopulated)?
      - use **Thiessen polygons**: a way of dividing up the landscape into areas that probably "belonged to" each site
      - simplest way:
        - draw lines connected each site to every other nearby site
        - draw a perpendicular line bisecting each of the connecting lines
        - these form polygons such that the area within each is closer to the site in the polygon's center than to any other site
      - slightly more sophisticated way:
        - estimate the size or population of each site
        - rather than bisecting the connecting lines, divide the connecting line proportionally to the size or area of the sites (farther away from bigger sites, closer to smaller sites)
      - there are computer programs for doing this sort of work

- Analysis based on **Central Place Theory**:
  - looks at locations and distances between sites
  - are small sites positioned to maximize access to markets (potential buyers of goods) by minimizing distance to the maximum number of people?
    - suggests production for exchange is most important, not defense, political control, etc.
  - are small sites positioned to minimize travel distance between them and larger centers?
    - suggests exchange, but with source of goods in larger cities
  - are small sites positioned to be close to one large one, and farther from the rest?
    - suggests need for defense, conflict between independent large centers
    - suggests that small sites are dependent on one large site, as in political control: city-states with their dominated territory
- **Site size hierarchies**: do site sizes reveal something about political organization?
  - sites all the same size would suggest an unspecialized society in which all settlements had similar functions
  - a few large sites and many small ones would suggest that the large sites might have had some additional functions that the small ones didn't
    - like a temple, royal palace, marketplace, craft workshops, etc.
    - even without any other information, such a pattern of site sizes suggests a more complex social, political, and/or economic organization
  - usually presented as a "rank-size" graph
    - with site size on the vertical axis (usually logarithmic)
    - and site size "rank" on the horizontal axis (that is, first on the left is the largest site, next is the second largest, etc.
    - the shape of the curve that this forms gives an idea of the distribution of site sizes
    - a steep drop from a single very large site is a "primate site size hierarchy": one big capital-like site, probably a highly centralized, strongly administered society
    - etc.
- **Non-site analysis** or **non-site archaeology**:
  - lump all material from each sub-region and compare
  - forest vs. grassland
  - hillsides vs. valley bottom, etc.
  - useful for some kinds of questions
  - useful when each site has too little material to say much about individual sites
- and there are many other more specialized approaches

- Point: from just in the spatial patterning of sites and the small amounts of material on the surface, one can figure out a lot about past societies