

GREG WOOLF

# Locating Resilience in Ancient Urban Networks<sup>1</sup>

## *Abstract*

One of the striking features of ancient Mediterranean urbanism is the capacity of individual cities to weather all kinds of shocks from earthquakes, floods, droughts, plagues, and crop failures to sieges and violent shifts in political gravity. This is all the more remarkable given the environmental precarity of ancient Mediterranean life, and the relative instability of so many of the political entities that ruled them. This paper considers these issues in relation to resilience. Resilience theory was developed in the 1970s to investigate why some ecosystems were better able than others to withstand external pressures. Resilient systems “absorb shocks”, “spring back”, or simply “adapt” after major disruptions. The idea has been borrowed by social scientists including archaeologists and town planners. This paper will ask where resilience is to be located in the ancient world, and will consider the role of urban economics, networks and imperial polities in promoting resilient cities in antiquity.

*How often have cities in Asia, how often in Achaia, been laid low by a single shock of earthquake! How many towns in Syria, how many in Macedonia, have been swallowed up! How often has this kind of devastation laid Cyprus in ruins! How often has Paphos collapsed! Not infrequently are tidings brought to us of the utter destruction of entire cities; yet how small a part of the world are we, to whom such tidings often come!*

Seneca *Moral Letters* 91.9

Ancient writers liked to narrate the calamities of ancient cities. The plague at Athens, its sack by Xerxes, by Sulla and again by the Heruli, the obliteration of Troy, Thebes, Carthage, Corinth and Jerusalem, and the many fires of Rome all offered historians fine set pieces. Yet in virtually every case these cities reappeared within at most a few generations. Cities did die, a few of them, like Sybaris in the instep of Italy and Ariba on the island of Lesbos.<sup>2</sup> But most were reborn, indeed many remain occupied today. The majority of Mediterranean cities that

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<sup>2</sup> Cartledge 2023.

existed in 500 BCE remained inhabited one thousand years later. This is despite the precarious ecology on which Mediterranean urbanism was founded, a patchwork of islands and plains broken up by harsh mountains and the sea, perennially arid in summer, with thin soils and few rich alluvial valleys. The Mediterranean, or parts of it, is tectonically volatile, and it was subject to droughts, food crises and occasional epidemics throughout the period. Cities also survived better than most of the political entities that briefly dominated them, thalassocracies, tyrannies, civic hegemonies, and the empires of Persia, Macedon and Rome. The resilience of ancient cities demands explanation.

My aim is to approach this through the lens of resilience theory, as it has developed from its origins in 1970s ecology, to its current usage by town planners, archaeologists and historians. I shall argue that the resilience of ancient cities does derive in part from some peculiarities of ancient Mediterranean urbanism, but in particular that it derives from a range of networks that connected ancient cities, and the path-dependency that those networks promoted. I shall start with a few points about resilience theory itself.

### *1. Resilience and Stability*

Resilience theory was originally designed to answer some problems that had emerged from the notion of equilibrium systems. Typically, ecologists examined systems in which a number of species of plants and animals interacted. When these interactions lead to no significant changes in the system over time it was treated as *at equilibrium* or *stable*. Individual plants and animals passed away, but the rough size of their populations remained much the same, as did their relations with each other. Yet once ecosystems were examined over longer time scales it became apparent that very few systems were at equilibrium, and only some had the capacity to reassert themselves after some external disruption. As C.S. Holling put it in the paper that introduced the concept,

An equilibrium centred view is essentially static and provides little insight into the transient behaviour of systems that are not near the equilibrium. Natural, undisturbed systems are likely to be continually in a transient state.<sup>3</sup>

Most often, the theory posits, resilient systems undergo what is termed an Adaptive Cycle in which phases of growth, stability, collapse and reorganization are repeated at various scales and over various periodizations. Some stimuli are internal: for example, the growth of predator species may diminish prey numbers and lead to a collapse among those predators. Others are external, for instance bad weather, disease or a pollution event. Ecological resilience is a measure of the capacity of any given ecosystem to bounce back over time. The concept has been borrowed by a wide range of other disciplines that work with complex systems, especially in the life and social sciences. As one of the most helpful introductions to the concept puts it,

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<sup>3</sup> Holling 1973, 2.

Resilience has, on the face of it, a relatively straightforward range of meanings having to do with flexibility, elasticity and resistance to stress, or at least returning to a previous state after experiencing stress.<sup>4</sup>

What contributes to making a system resilient? There are many discipline specific answers, but a few general themes recur. One is the idea that *adaptable* or *flexible* systems are more resilient than rigid ones. Biodiversity increases the resilience of most natural systems, because it entails *redundancy*, for instance more than one food source, or a range of predators. A similar logic applied to economic systems. Manufacturers with a range of products or banks that diversify their business are better able to deal with sudden shocks than are more specialised enterprises. It follows that more simple systems tend to be more fragile than complex ones. There is often a trade-off between profitability and resilience. A business that removes redundancy and aims to maximizing its performance under narrow parameters will be less resilient when those parameters change. Peasant farmers around the world know that the best way to deal with risk is to practice a mixed economy: monocultures may be more profitable in the short term, but the loss of resilience is particularly threatening to the poor.<sup>5</sup>

Resilience theory has had its critics.<sup>6</sup> Inevitably successive appropriations are felt by some to have dulled its analytical edge until it has become almost interchangeable with sustainability or adaptability.<sup>7</sup> A number of recent studies associate resilience closely with resistance, for example in accounts of the success of indigenous groups in withstanding the encroachment of modernity. The term's use by social planners has given rise to the complaint that in seeking to resist transformative change it serves vested interests, reproducing a range of social inequalities.<sup>8</sup> It also matters where attention is focused in a system: some political or financial systems that look at first quite resilient turn out to distribute the social cost very unevenly. So, Ottoman Anatolia seems at first sight to have survived a long period of drought at the end of the sixteenth century, but on closer examination the cost of survival was disproportionately born by peasants and farmers, while pastoralists gained land and the imperial state preserved its revenues.<sup>9</sup> It follows that historians need to pay particular attention to whose interests resilience serves.

The city has been a site of particular interest in resilience studies. Geographers and other social scientists recognise in the city one of the most complex social forms in existence, and town planners now actively attempt to promote resilience. Urban resilience today is treated as a measure of a city's vulnerability to risks of various kinds, and once again adaptability and redundancy are seen as vital. So Kowalik and Guaralda begin their paper 'Mapping Urban Resilience. A framework for changing cities' with the dictum that,

Urban centres base their resilience on the ability to evolve and adapt as needed throughout their life.<sup>10</sup>

<sup>4</sup> Haldon, Rosen 2018. See also Haldon *et al.* 2020.

<sup>5</sup> Forbes 1976.

<sup>6</sup> For a review of the concept Hannig 2016.

<sup>7</sup> Bollig 2014.

<sup>8</sup> White, O'Hare 2014; Pavicevic, Bulatovic 2018.

<sup>9</sup> Izdebski, Mordechai, White 2018.

<sup>10</sup> Kowalik, Guaralda 2011.

So cities that have relied very heavily on one manufacturing industry have often shown little resilience when markets collapse or production is relocated, administrative centres are vulnerable to political change, mining towns can collapse when the price of their products drops and so on. Town planners are also interested in the risks posed by terrorism, climate change, and fire or disease. The Rockefeller Foundation funded project ‘100 Resilient Cities’ differentiates chronic stresses (we might think of malnutrition, poor sanitation or a high level of endemic disease)<sup>11</sup> from acute stresses (such as the eruption of Vesuvius or the arrival of the Antonine and Justinianic Plagues).<sup>12</sup> Chronic and acute stresses are often closely connected of course. The ‘constant catastrophe’ of malnutrition increases a society’s vulnerability to acute threats such as famine and epidemic disease.<sup>13</sup> Many disasters emerge from the combination of vulnerabilities emerging in part from social or political organization and sudden external events such as earthquakes, long winters or heavy rainfall.<sup>14</sup>

## 2. *Resilient Cities in Antiquity*

Resilience is a relatively new concept to most historians of antiquity: archaeologists caught on more quickly. Already in 1978 Robert Adams discussed the contrast between stability and resilience in relation to the urban systems of Bronze Age southern Mesopotamia, using the two categories to explain the failure of several projects of political and economic centralization and the persistence of small-scale communities.<sup>15</sup> A strand of anthropological archaeology continues to contrast household resilience with state collapse.<sup>16</sup> Charles Redman and Ann Kinzig published a wider survey of its utility in 2003.<sup>17</sup> Archaeologists, they argued, are experts in observing long-term change, so they are well placed to identify recurrent cycles of growth and contraction and the ultimate causes of those changes as well as the proximate stimuli. Perhaps optimistically, Redman and Kinzig see an increase in resilience over time from the late Pleistocene through the Holocene periods. But they do note that when complex societies maximise their efficiency they often decrease their resilience.

A good deal depends on where the boundaries of the system are set, and what counts as a failure to be resilient. There have been a number of studies of how entire complex societies collapse, notably those of Joseph Tainter and Jared Diamond.<sup>18</sup> Responses to the latter work, such as the papers collected in a volume edited by Patricia McAnany and Norman Yoffee, emphasise the difficulty in characterising collapse, and make the point that political collapses are not always synchronised with ecological or demographic ones.<sup>19</sup> Like Tainter they argue that true collapses are very rare. Like Adams they argue that when systems restructure what

<sup>11</sup> Scobie 1986; Scheidel 2003; Garnsey 1999.

<sup>12</sup> <https://www.rockefellerfoundation.org/100-resilient-cities/>

<sup>13</sup> Garcia, Escudero 1982.

<sup>14</sup> Grey 2020.

<sup>15</sup> Adams 1978, citing as his inspiration Branscomb, Gazis 1977.

<sup>16</sup> E.g. Faulzeit 2012.

<sup>17</sup> Redman, Kinzig 2003.

<sup>18</sup> Tainter 1988; Diamond 2005. See also Yoffee, Cowgill 1988.

<sup>19</sup> McAnany, Yoffee 2010. See also Costanza, Graumlich, Steffen 2007.

endures are often smaller level structures. Villages, local identities and households seem more resilient than empires and states.

This line of argument offers one approach to the resilience of ancient cities. It was a commonplace of ancient rhetoric that cities and peoples survived while empires rose and fell around them: Aelius Aristides smuggles this into his oration *To Rome* (14) and it also features in apocalyptic literature such as the *Book of Daniel* and *Revelations* (17). That observation was well founded. Cities were, in general, more resilient than most political structures before the rise of Rome. It is certainly possible to look at cycles of expansion, collapse and reconfigurations in the case of empires or civilizations, and others have done this.<sup>20</sup> But the resilience of individual cities is another matter.

The long-term history of the ancient city is now relatively well understood.<sup>21</sup> Urban growth in the Mediterranean region took place discontinuously over the last millennium BCE and the first few centuries CE. First the geographical distribution of cities increased, progressing at different rates in different regions, moving broadly east to west and from the littoral into the Mediterranean's continental hinterlands. Slow demographic growth was one enabling factor, but it was manifested not in larger cities, but in more cities. More precisely only a very few cities exceeded a few thousand inhabitants, and these were generally those with larger territories and the social power to reach beyond them, such as Athens and Sparta. At this point it is conventional to introduce the notion of political growth, the emergence of first city-states, then hegemonic powers and finally micro-empires.<sup>22</sup> A third stage is marked by the replacement of those hegemonic powers with monarchical empires, beginning with Persia, but especially those of the Hellenistic and Roman periods which harnessed cities to provide a kind of local government responsible for keeping the peace and collecting taxes. Where there were no existing cities to perform these roles, new ones were founded, as the Romans did in temperate Europe. How these cities fared in late antiquity and afterwards depended in part on how far they still proved valuable to ruling powers, and how far they could find other roles to play.<sup>23</sup>

Parallel to this, however, is a narrative (also discontinuous) of urban failures. It begins in the early first millennium with foundations that for one reason or another did not endure. Greek foundation myths frequently mention earlier sites that were abandoned, movements of refugees from one city to join members of another, sites that turned out to be ill-chosen, episodes of conflict with locals and ventures that were abandoned early on like those the Spartan prince Dorieus tried to found in Libya and Sicily. One reason the set of cities that existed in 500 BCE were still largely successful in 500 CE is that they were already the product of fierce selection. The same applies to later groups of cities, such as the many foundations created up and down the Italian peninsula during the third and second centuries BCE. While a number flourished, there were also many that needed repeated injections of settlers and some which were apparently abandoned by those who had been sent there. New foundations were not always sustainable: the city of Megalopolis in Arcadia, created as a counterbalance to

<sup>20</sup> Adams 1978 on Bronze Age Mesopotamia and the Sasanian Empire, Haldon, Rosen 2018 on early Byzantium, Redman, Kinzig 2003 on Bronze Age Mesopotamia and the Hohokam of Arizona.

<sup>21</sup> Zuiderhoek 2016 chapter 2.

<sup>22</sup> Morris 1991.

<sup>23</sup> Wickham 1984; Rapp, Drake 2014.

Sparta, became a watchword for failure of this kind (cf. Strabo 8.8.1). Selective pressures continued to shape and reshape ancient civic networks throughout antiquity.

Less easy to document are those pressures which kept the populations of most cities low. Their small size even during the Roman Urban Apogee has been made apparent by a number of recent surveys that have come to the conclusion that there were around 2000 urban communities in the late second and early third centuries CE.<sup>24</sup> Luuk De Ligt's total is slightly higher than that of Andrew Wilson, and Jack Hanson has a much more conservative estimate of under 1400. But the differences in their totals derive not from substantive disagreements about the phenomenon, but from the difficulties of deciding how to distinguish small cities from large villages.<sup>25</sup> They also agree that most cities were very small indeed. Wilson estimates that three-quarters had populations of 5000 inhabitants or less. This conclusion is similar to the results reached by Mogens Herman Hansen and his collaborators in the Copenhagen Polis Centre, considering the urbanism of the fifth and fourth centuries BCE.<sup>26</sup> It is evident that Mediterranean cities were almost all very small, some of them smaller than the larger Neolithic villages of Anatolia, Mesopotamia and central Europe.<sup>27</sup> The exceptions were those cities with greater military muscle and or more territory than most of their neighbours. If we ask why, in a period of demographic expansion, most cities remained so small it is difficult to avoid the conclusion that selective pressures were again operating to limit settlement size.

My argument is that most ancient cities were selected for resilience. Small size conveyed several advantages in the ancient Mediterranean world. The most obvious one was that smaller communities coped better with drought and consequent food crises. The proportion of the population not engaged in food production was lower, storage was easier to arrange, and if imports of food were needed the required volume was more manageable. The populations of cities of just a few thousand had access to many of the same coping strategies used by peasants, indeed some of their inhabitants might usefully be considered as peasants.<sup>28</sup> Others had the option of temporary relocation to rural or other residences.

Micro-cities might not seem to show the flexibility or adaptability of highly resilient systems, but many of their inhabitants did. A high proportion of the inhabitants of ancient micro-cities were engaged in farming for a significant part of their time, producing mostly for themselves and otherwise for local markets. Others worked in industries that serviced *rentier* landlords and peasants alike, but again it was rare for families to be highly specialised. Below the level of the city, individual households were perhaps even more resilient. Those few cities that did grow in size did so at the cost of resilience unless they had alternative resources such as the economic power to purchase food from distant areas and/or the military dominance to pass on the social cost to subject populations.

One final advantage enjoyed by micro-cities is that most were not dependent on wider exchange systems. We do not need to return to fetishizing autarky to see that those small cities that had survived the selective pressures of the early last millennium BCE were well suited to survive on local resources. Ancient towns were centres for local exchange, and these did con-

<sup>24</sup> Wilson 2011; Hanson 2016 and Luuk de Ligt in his ERC project Empire of Two thousand Cities.

<sup>25</sup> On this see the review of Hanson 2016 by Damjan Donev and Rinse Willet in *AJA* 2017, 121.4.

<sup>26</sup> Hansen, Nielsen 2004.

<sup>27</sup> For detailed argument, Woolf 2020.

<sup>28</sup> Garnsey 1988, chapter 4. See also Halstead, O'Shea 1989.

nect into the wider world by those ‘weak ties’ that Granovetter showed could be so important.<sup>29</sup> But like peasant households, these small communities produced most of what they consumed and consumed most of what they produced. Their scale and their lifestyles were well adapted to the difficult ecology of much of the ancient Mediterranean world.<sup>30</sup>

Large cities were different. Those that survived did have to be flexible and adaptable. Athens could at different points in its long biography develop its military capacity, its resources of marble and silver, its commercial power and eventually its potential as a centre for tourism and education. Put otherwise, Athens had considerable redundancy. Alexandria in Egypt, originally a political foundation, successfully survived the loss of its role as an imperial capital, becoming a major commercial and intellectual centre in the Roman Mediterranean.<sup>31</sup> Not all imperial capitals did so well. Serdica and Trier mushroomed when they were the seats of tetrarchic courts but shrank when the emperors moved elsewhere. Many cities survived beyond their period of glory as much reduced versions of themselves. That too is a form of adaptation of course.

### 3. Resilient networks?

Ancient cities were not isolated however. Some of the resilience of cities may have been vested in their wider connections.

Perhaps the most obvious kind of connection was that formed by political power. Ancient empires seem not to have invested in increasing the resilience of cities, with the partial exception of capitals, which were provided with warehouses and improved harbour facilities like those created at Portus at the mouth of the Tiber, at Alexandria and Caesarea Maritima. Emperors would occasionally make mitigating interventions after disasters. Tiberius remitted five years’ worth of imperial taxes to the cities of Asia devastated by an earthquake in 17 CE. Caligula and Trajan sponsored repairs to Antioch following earthquakes in 37 CE and 115 CE respectively.<sup>32</sup> For the city of Rome at least a similar pattern can be seen in relation to floods and fires, with imperial activity mostly following disasters.<sup>33</sup> Recent studies of Antioch in the sixth century CE stress not only the repeated disasters suffered by the city – it suffered earthquakes and outbreaks of plague, and was also sacked by the Persians – but also the rapidity of its recovery thanks to support given by the Roman emperors in Constantinople. Other cities nearby that did not enjoy imperial support were much slower to recover.<sup>34</sup> This provides some interesting ways to think about the resilience of larger cities. Their size meant their vulnerabilities were greater. But they were also more entitled, in Amartya Sen’s sense, since they had first call on the limited resources of ancient states.<sup>35</sup>

The limits of those resources were very evident when it came to moving people or food rapidly to areas of need. Most cities in trouble were out of the range of effective state help. *The Corrupting Sea* tells a story of gluts as well as dearths, but the fragmented Mediterranean

<sup>29</sup> Granovetter 1973.

<sup>30</sup> This argument is a major theme of Woolf 2020, drawing on those of Horden, Purcell 2000.

<sup>31</sup> Harris, Ruffini 2004.

<sup>32</sup> Downey 1963.

<sup>33</sup> Aldrete 2007.

<sup>34</sup> Mordechai 2018; Izdebski, Mordechai, White 2018; Wallace-Hadrill Unpublished.

<sup>35</sup> Sen 1981.

it depicts constrained most of its inhabitants within small worlds.<sup>36</sup> Seasonality, maritime technology, and the small size and number of vessels severely limited mobility around the Middle Sea.<sup>37</sup> Information moved relatively quickly, and in the right conditions some impressive regular transportations of commodities were achieved. But rapid evacuations or emergency relief supplies were out of the question. Cheap mass transportation would have greatly increased the resilience of the system, but there is no sign it existed. The botched attempt at evacuating refugees from the Vesuvian cities in 79 CE, even with one of the largest Roman naval bases close at hand, illustrates these difficulties. Help, if it were to come, would have had to come from nearby, and in many cases of drought, plague or earthquake neighbouring cities were suffering the same disasters.

There is one sense in which urban networks may have promoted the resilience of their component parts. The material physical investment, not just in the fabric of cities but also in the roads and ports that connected each city to the others, was relatively expensive. It became more so over time as cities acquired more substantial urban architecture. Rebuilding elsewhere, or even failing to rebuild a disaster struck city, would leave a visible gap, an empty node in the network.

Consider the location of Corinth, not just straddling the isthmus but also with ports on two seas, close to one of the most ancient panhellenic sanctuaries and provided with the natural fortress of the Acrocorinth. Leaving the space empty after the destruction in 146 BCE was in the end unrealistic. Again, the great fire of Lyon, which is Seneca's starting point for the letter with which this paper began, had no lasting impact. Lyon was the fulcrum of the road system of the Gallic provinces, the site of a major sanctuary of the imperial cult and also of a mint. The cult and the mint might have been moved, but there was no more sensible place to rebuild the colony.

One way to consider this is as manifestation of path dependency. Once the network had become configured in a particular way, it was difficult to remove any one part of it. At most new cities 'replaced' old ones on nearby sites, as when Thurii replaced Sybaris or Tunis Carthage. In this sense, then, infrastructural systems sustained individual cities and made some of them priorities for rebuilding. Cities that were only loosely connected into the network did not have this protection. Waldgirmes in 'Free Germany' was abandoned before it could be connected, and the cities of Dacia lost in the third century were, by their geographical marginality, more easily detached. Things were different in the interior of the empire.

Ancient urban networks evolved as well. This typically happened when individual nodes and routes changed their significance, as happened when Milan was elevated to imperial capital in the fourth century CE. This sort of shift in ranking and function among the cities on a network expressed the flexibility that is characteristic of resilient systems. What could be a better expression of redundancy than the four tetrarchs, each with his own court, palace and imperial city?

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<sup>36</sup> Horden, Purcell 2000.

<sup>37</sup> Woolf 2016.



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### *Conclusions*

The resilience of ancient cities derived from several factors. Most important was the fact that during episodes of urban expansion so many of the less viable foundations failed. The selective pressures of Mediterranean ecology kept cities small, and weeded out those planted on poor sites. Political growth was superimposed on this pattern, and it allowed a few cities to grow beyond the limits of their local carrying capacity. Yet without the support of the imperial state no large city could survive for long. Neither the market, not imperial power could extend protection over more than a fraction of the Mediterranean's cities. The tyranny of distance forced most communities to be self-reliant. The growth of infrastructure did contribute a little to the resilience of some cities. Literary texts evoked ancient glories and sacred places, but in the end the location, roads and ports probably mattered more. The resilience of ancient cities lay in their early adaptation to Mediterranean landscapes, and in the path dependency that followed their construction and their connection to one another.

*Greg Woolf*

*Departments of History and Classics and the Cotsen Institute of Archaeology,  
University of California, Los Angeles  
gwoolf@history.ucla.edu*

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