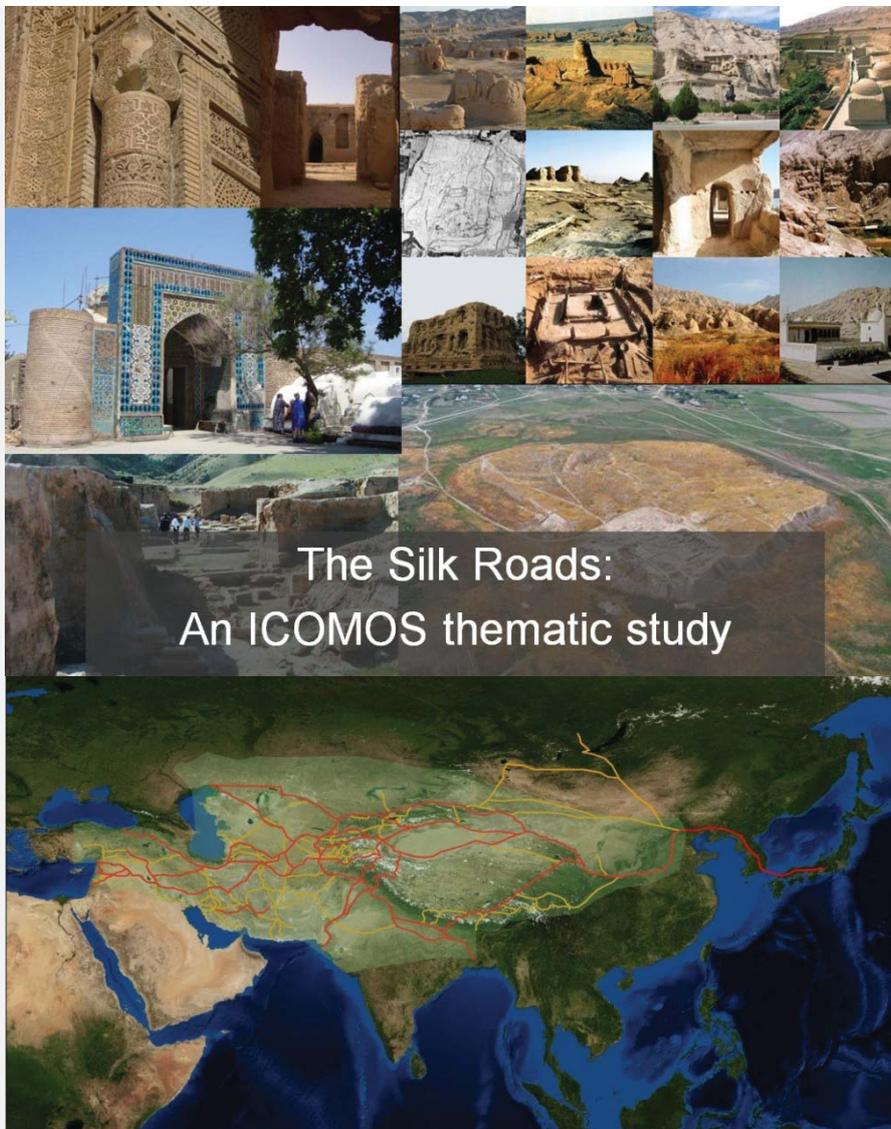


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international council on monuments and sites

The Silk Roads: an ICOMOS Thematic Study

by Tim Williams
on behalf of ICOMOS
2014



In cooperation with



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International Council of Monuments and Sites

11 rue du Séminaire de Conflans

94220 Charenton-le-Pont

FRANCE

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States Parties covered by this study

Active partners in the UNESCO *Serial transnational World Heritage nominations of the Silk Roads* project: Afghanistan, People's Republic of China, Republic of India, Islamic Republic of Iran, Republic of Kazakhstan, Kyrgyz Republic, Federal Democratic Republic of Nepal, Republic of Tajikistan, Turkmenistan, and Republic of Uzbekistan.

Countries at least partly covered by the Thematic Study and who may wish to join the project: Republic of Armenia, Republic of Azerbaijan, People's Republic of Bangladesh, Kingdom of Bhutan, Republic of Iraq, The State of Israel, Italy, Japan, Hashemite Kingdom of Jordan, Republic of Korea, The Democratic People's Republic of Korea, Republic of Lebanon, Mongolia, Islamic Republic of Pakistan, the State of Palestine, Syrian Arab Republic, and Republic of Turkey.

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1 Context for this thematic study

1.1 The purpose of the study

ICOMOS thematic studies are a synthesis of current research and knowledge on a specific theme. The aim of this study is to provide an analysis of sites along the Silk Roads that could be used by States Parties participating in the *Serial transnational World Heritage nominations of the Silk Roads* as a basis for comparative analyses when nominating series of sites.

The scale of existing research on this topic is extensive, ranging from synthetic works and maps, to studies of individual regions and sites¹. The inclusion of sites in this paper is not an indication of their individual significance, or their potential as part of World Heritage serial properties, but rather as part of a wider overview of the nature of sites along these vast routes.

The study does not attempt to recommend any specific series of sites for Tentative Lists or for nomination.

This study specifically aims to:

- Provide an analysis of sites along the Silk Roads that could be used by States Parties participating in the *Serial transnational World Heritage nominations of the Silk Roads* as a basis for comparative analyses when nominating serial properties.
- Profile the distribution and distinctiveness of Silk Roads sites in order to understand how sites are manifestations of the shifting systems of power and patronage that prevailed over time along the Silk Roads, in relation to the organisation of flourishing trade and the protection of trade routes.
- Define the distribution of Silk Roads sites, in order to understand:
 - What sites are common to the whole extent of the Roads
 - What sites are specific to the whole Silk Roads or to certain parts of the Roads
 - What sites are unique or exceptional
 - Which sites are plentiful and how their form varies in time and space
 - What sites are persistent over time
 - What sites reflect specific periods of history, power systems or cultural traditions
 - Consider whether certain sections or corridors of the Silk Roads, through the assembly of sites within them, are distinctive from other sections of the Silk Roads, in terms of being manifestations of particular geo-cultural systems, and whether a case could be made for considering the Silk Roads as a collection of World Heritage properties, linked by a concept, instead of one single World Heritage serial property.

¹ See Annex 5 on bibliographic sources.

The Thematic Study was directed by Tim Williams, Institute of Archaeology, University College London (UCL), with the support of members of UCL, and carried out in collaboration with Susan Denyer (ICOMOS) and Feng Jing (UNESCO World Heritage Centre).

1.2 Background to this study

1.2.1 Global Strategy

In 1988 UNESCO launched its *Integral Study of the Silk Roads: Roads of Dialogue* project, to highlight the complex cultural interactions which arose from the encounters along the Silk Roads. This prompted a number of regional meetings and scientific expeditions.

At broadly the same time a number of key debates were taking place regarding cultural routes and the development of a global strategy for addressing the representivity of the World Heritage list. Key papers included:

- Desk study on the Asia Region (ICOMOS 2002)
- Draft Framework for World Heritage Cultural Representation (Jokilehto et al. 2003).

In 2004, ICOMOS published *The World Heritage List: Filling the Gaps – An Action Plan for the Future* (ICOMOS 2004). The review analysed cultural sites on the World Heritage List and Tentative Lists, using regional, chronological, geographical and thematic frameworks. The intention was to assess the then current representation of sites, likely short- to medium-term trends, and identify under-represented categories.

The review has a number of ramifications for the present study. In particular, it identified that, “in spite of its remarkable historical background and numerous historic/cultural sites in the sub-region, Central Asia remains one of the most under-represented regions on the World Heritage List” (UNESCO 2008a).

1.2.2 Cultural routes

The work of the ICOMOS *International Scientific Committee on Cultural Routes* (CIIC)² is also important in this context. An expert meeting in Madrid in November 1994 stated that:

“The concept of a cultural route or itinerary refers to a set of values whose whole is greater than the sum of its parts and through which it gains its meaning; identification of the cultural itinerary is based on an array of important points and tangible elements that attest to the significance of the itinerary itself. To recognize that a cultural itinerary or route as such necessarily includes a number of material elements and objects linked to other values of an intangible nature by the connecting thread of a civilizing process of decisive importance at a given time in history for a particular society or group” (ICOMOS International Scientific Committee on Cultural Routes 1994).

² <http://www.icomos-ciic.org/CIIC/CIIC.htm>

Development on the theory and implementation of cultural routes led to modifications to the *World Heritage Operation Guidelines* (UNESCO 2005; updated in 2008b; and 2012), in which the concept of ‘heritage routes’ was defined as:

“based on the dynamics of movement and the idea of exchanges, with continuity in space and time; refers to a whole, where the route has a worth over and above the sum of the elements making it up and through which it gains its cultural significance; highlights exchange and dialogue between countries or between regions; is multi-dimensional, with different aspects developing and adding to its prime purpose which may be religious, commercial, administrative or otherwise. ... The identification of a heritage route is based on a collection of strengths and tangible elements, testimony to the significance of the route itself.” (UNESCO 2008b, 91)

1.2.3 Serial transnational World Heritage nominations of the Silk Roads

From as early as 2003 consideration was being given to the development of a transboundary nomination for the Silk Roads (Jing & van Oers 2004). A series of sub-regional workshops were then developed, in Almaty in November 2005, Turfan in August 2006, Samarkand in October 2006 (UNESCO 2006), Dushanbe in April 2007, Xi’an in June 2008, and Almaty in May 2009 (UNESCO 2009a), all of which culminated in the first meeting of the Coordinating Committee for the Silk Roads Serial Nomination, in Xian, China, 3-6 November 2009 (UNESCO 2009b).

Importantly, as a result of these meetings a *Silk Roads concept paper* was developed, initially in 2006 by Professor Henry Cleere (2006) and refined at the subsequent meeting at Dushanbe (UNESCO 2007). This defined the geographical and historical scope of the Silk Roads in relation to possible World Heritage nominations.

The need for this Thematic Study was identified at the first meeting of the Coordinating Committee for the Silk Roads Serial Nomination in Xian in November 2009 and the study was subsequently commissioned by ICOMOS in June 2010.

1.2.4 Ittingen expert meeting 2010

In February 2010 an *International World Heritage expert meeting on serial nominations and properties* was held in Ittingen, Switzerland (<http://whc.unesco.org/archive/2010/whc10-34Com-9Be.pdf>). The conclusions of that meeting are directly relevant to the nomination strategy for the Silk Roads. Specifically:

The 2008 operational guidelines stated that the components of a serial property should be of: “a) the same historico-cultural [sic] group; b) the same type of property which is characteristic of the geographical zone”; but the Ittingen meeting concluded that this “may lead to a mere catalogue of sites without an adequate definition of the functional links between the component parts, or an explanation as to how they contribute to the Outstanding Universal Value (OUV) of the property as a whole”.

This has fundamental implications for the Silk Roads project: clearly the Silk Roads do not represent the same historical/cultural group, or the same type of property in a geographical zone: indeed the Silk Roads are an anathema to both these concepts. The Ittingen recommendations, therefore, are very helpful in this context.

The main recommendations of the Ittingen expert meeting were recognised by the World Heritage Committee at its 34th session in Brasília, Brazil, 2010 (Decision 34 COM 9B)³ and modifications to the *Operational Guidelines* were subsequently agreed at the 35th session in 2011⁴:

137. Serial properties will include two or more component parts related by clearly defined links:
- a) Component parts should reflect cultural, social or functional links over time that provide, where relevant, landscape, ecological, evolutionary or habitat connectivity.
 - b) Each component part should contribute to the Outstanding Universal Value of the property as a whole in a substantial, scientific, readily defined and discernible way, and may include, inter alia, intangible attributes. The resulting Outstanding Universal Value should be easily understood and communicated.
 - c) Consistently, and in order to avoid an excessive fragmentation of component parts, the process of nomination of the property, including the selection of the component parts, should take fully into account the overall manageability and coherence of the property.

This is an important issue for the Silk Roads. The scale of the Silk Roads is vast and it is vital to maintain a sense of spatial integrity whilst finding a manageable sub-set of sites and landscapes that can be effectively managed.

The Ittingen Expert Meeting also recommended that:

“the format for Tentative List submissions for serial transnational and transboundary sites ... would indicate the agreement between all of the States Parties involved. The proposed property would therefore only be registered within the Tentative Lists as a serial transnational site when all States Parties involved have included their component parts in their national Tentative Lists” (Martin & Gendre 2010, 69).

The meeting also stressed “the opportunities for international assistance and regional training workshops” (*loc cit*). This is a crucial aspect of the Silk Roads project (see section 7.3).

Helpfully, the meeting also noted that:

1.6 The Meeting recommended promoting and implementing the concept of transnational serial nominations as a tool for international cooperation, shared approaches and thus better management and conservation practice – for example, by using new technologies such as establishing virtual visitor centres which, in particular, facilitate the understanding of the concept and scientific framework of such nominations.

³ Available at: <http://whc.unesco.org/archive/2010/whc10-34Com-9Be.pdf>

⁴ Available at: <http://whc.unesco.org/archive/2011/whc11-35com-20e.pdf>

2.3.2 When a series of sites is nominated, each State Party should be aware of the implications (both in terms of opportunities and benefits, as well as specific additional challenges) in relation to the nomination strategy they choose to adopt. Examples of different nomination strategies include:

- a. Nominating single properties, including series of national sites;
- b. Extensions to existing World Heritage properties (both single or serial);
- c. Nominating a series of single properties under a common framework (but not constituting a single property);
- d. Nominating a single serial transnational property.

2 The Silk Roads: background, definitions and scope

2.1 The Silk Roads

The Silk Roads⁵ were an interconnected web of routes linking the ancient societies of East, South, Central, and Western Asia, and the Mediterranean. It contributed to the development of many of the world's great civilizations and enabled the exchange of technologies and ideas that reshaped the known world⁶. This combination of routes represents one of the world's preeminent long-distance communication networks (Figure 1).

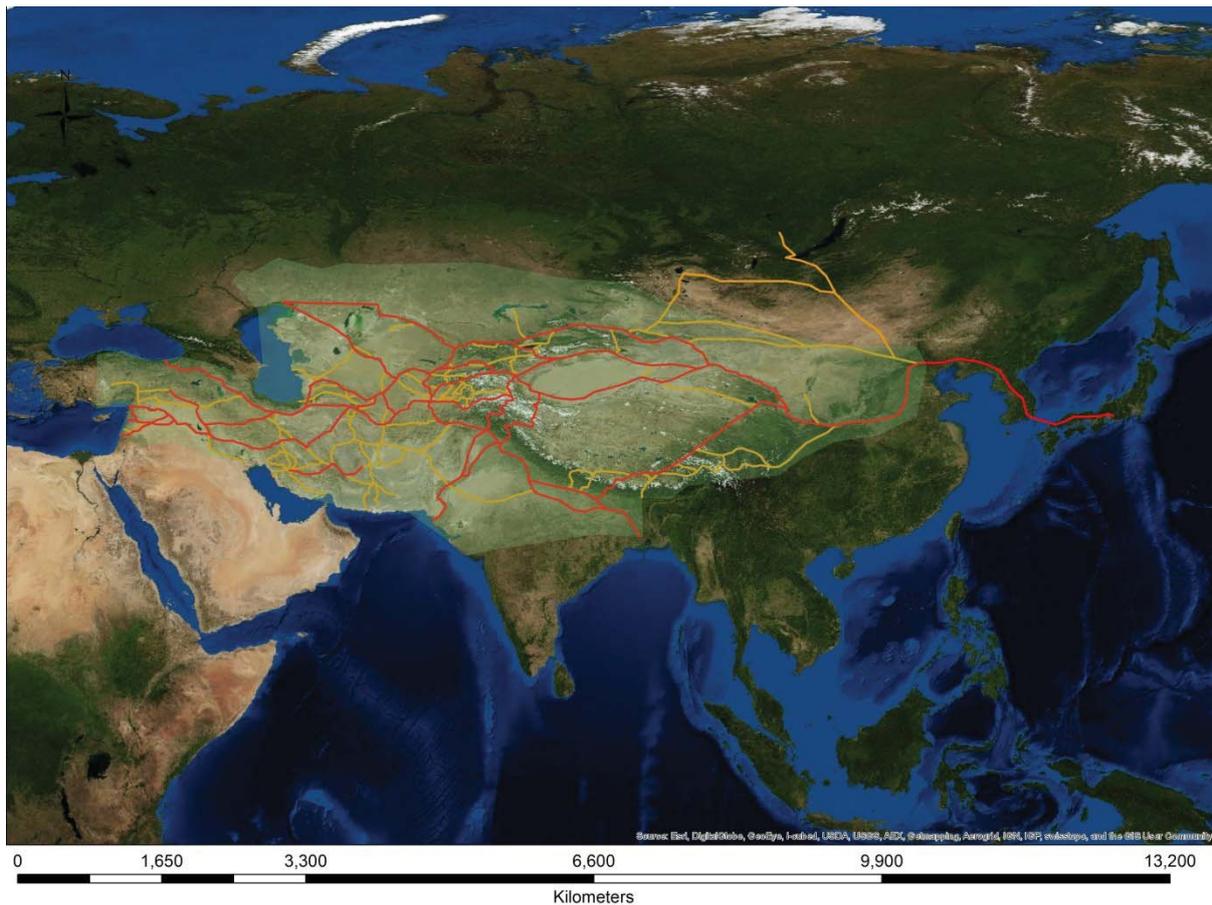


Figure 1. The vast geographical extent of the terrestrial Silk Roads, showing major routes (in red) and other significant routes (orange).

There were a number of major impacts from this extensive network of interactions:

- The development of cities along these routes, which gained power and wealth from the trade, providing the infrastructure of production and redistribution, and policing its routes. Many became major cultural and artistic centres, where peoples of different ethnic and cultural backgrounds intermingled.

⁵ A term coined by the 19th century German geographer Ferdinand von Richthofen.

⁶ For recent general works on the Silk Roads (Whitfield & Sims-Williams 2004; Boulnois 2008; de la Vaissière 2002; Hansen 2012; Liu 2010; Liu & Shaffer 2007; Millward 2013; Nebenzahl 2004; Tucker 2003; Waugh 2008; Whitfield 2009; Wood 2002).

-
- The development of religious centres, which benefitted from the patronage of political systems and wealthy individuals.
 - The movement of technologies, artistic styles, languages, social practices and religious beliefs, transmitted by people moving along the Silk Roads.

The Silk Roads spans a vast geographic area (section 2.4), over a protracted timeframe (see section 2.5), that it presents significant problems with scale and resolution. The sheer scale of these routes has meant that their complexity and impact is still under-researched and often simplified into anecdotes. Broad-scale maps are common; large pen strokes across a map of half the world, from Japan to the Mediterranean; there have been some excellent regional studies; some useful historical accounts of sections of the route; and numerous points of mapped data (such as the work on caravanserais, way-stations and monasteries in Matthew Ciolek’s brilliant OWTRAD website)⁷. But there remains a problem of the sheer scale of the routes and their impact, both spatially and chronologically.

2.2 Silk Roads’ misconceptions: neither silk nor roads

The term ‘Silk Roads’ (*Seidenstrassen*) was first coined by the 19th century German geographer Ferdinand von Richthofen in a lecture in 1877. However, he also recognised that there was a wider phenomenon of trans-Eurasian exchanges which are “now encompassed by the shorthand we know as the silk road” (Millward 2013).

The first misconception, which the name ‘Silk Roads’ embodies, is that *silk* was the primary commodity or driver of the exchange systems. In reality there were a great number of goods being moved, over both short and long distances, and through a variety of different mechanisms (section 2.3). Many had a far greater impact than silk, reflecting the spread of technologies (such as gunpowder, paper or cotton production⁸), or were moved in far greater volumes (e.g. salt, tea, copper or iron).

Elements of this inter-connected system have sometimes been labelled with other single-commodity terms, such as the *salt route* or *the tea-horse road*, or split by topographic terms, such as the *desert route*: again, these do not really capture the complexity of the trade goods or their impacts. These names also obscure the complexity of goods, material, peoples and interactions; they blur the interconnections between routes and their stimuli/drivers and serve to compartmentalise a complex systems of interactions. Where did the tea-horse road stop and the salt route start, and how do these relate to the Silk Roads? Nevertheless, these terms, perhaps especially the ‘Silk Roads’, have passed into common parlance: they have become evocative labels. As a result this study, and the UNESCO *Serial transnational World Heritage nominations of the Silk Roads*, uses the term ‘Silk Roads’, but adopts the very broadest possible definition of the routes and materials exchanged. What is of interest is the complexity of the interactions and their impact upon the development of past and present societies. So the term ‘Silk Roads’ here is used to encompass this broad network, and encompasses routes that many might be more familiar with by other names, such as the tea-horse route.

⁷ <http://www.ciolek.com/owtrad.html>

⁸ The spread of the cotton industry, for example, was to have a major impact upon world economies (Riello 2013).

A second misconception is that the principal impact of the Silk Roads was as an economic trading network. There is no doubt that the movement of goods, and the volume of exchange (and the taxation systems that extracted wealth from this process; section 2.3), had a massive impact on many of the societies along the Silk Roads. It shaped their ability to construct the cities, religious monuments and elite structures for which the Silk Roads are famous. But the most significant outcome of these complex networks of interactions was the movement of people and ideas: the spread of religions, social customs, languages, political ideas, agricultural practices, scientific knowledge and technological innovations (section 6.3.5) (e.g. Dani 2002).

Another further misconception is that the Silk Roads are primarily about the exchange of material between East and West, as typified by silk: initially produced in China and transported as far west as Europe. But the movements are much more complex: goods and people did not simply flow from east to west and vice-a-versa. Many of the materials traded emanated in Central or South Asia (section 2.3), and many of the ideas that moved along the Silk Roads started in neither the east nor west (e.g. Buddhism). As a result the patterns of routes from north to south are also vital elements of the complex system that is being explored (see section 2.4). There is no doubt that understanding the routes across Central and South Asia is essential to understanding the Silk Roads. The Silk Roads have often been defined by their impact upon the ends, China and Europe, but this significantly underplays the complexity of their overall impacts, almost making them seem of more relevance to the ends than the rest of the regions through which they passed. The reality is that the Silk Roads were essential in shaping the societies along their whole length.

Goods and ideas moved north-south as well as east-west. Crucial exchanges took place across the Tibetan plateau and through the high mountain passes of the Karakoram mountain range (e.g. via the Khunjerab Pass), linking Xinjiang with modern day Nepal, Bhutan, Pakistan, India and Bangladesh (Freeman & Ahmed 2011; Fuchs 2008; Millward 2007; Tong 2013). The complex links between Central Asia and South Asia, through Afghanistan and Pakistan, was also a vital aspect of the cultural exchange (e.g. see the recent study on the 'Great Indian Road' by Edvard Rtveladze 2012). The much commented upon routes travelled by Buddhist monks, so vital in the movement of ideas from South to East Asia, who all used south-north paths that connected South and Central Asia (Chandra & Banerjee 2007; Bernstein 2002; Boulnois 2008; Faxian 1886; Neelis 2011; Wriggins 2004). These were crucial aspects of the Silk Roads and it is vital that the complexity of movements does not become over-simplified into an east-west dialogue.

There are also misconceptions regarding the number of routes and their variability in space and time. There was no single road winding from Asia to Europe. Rather there was a diversity of paths, tracks and roads, changing not only over time, but also fluctuating seasonal as river crossings and mountain passes became impassable, and shifting as travellers passed across wide valleys and steppes, choosing different routes across the landscape (section 5.1). Regional conflicts, changing markets and shifting political power meant that the Silk Roads were never static. The importance of specific sections of the routes changed over time, in response to a variety of socio-political factors. It is these spatial and temporal changes in exchange and trade, and the scale of movement of people and ideas, which articulates the significance of the Silk Roads. As a result this report always uses the plural 'Silk Roads', rather than the singular.

Another issue to note is that the Silk Roads were never a systematically planned network of routes, or infrastructure, over its entire length; in certain regions, and at specific times, it was very well planned and supported (for example, the system of Seljuk caravanserais (e.g. Silverstein 2007), or Han dynasty forts (e.g. Millward 2007)), but it was often very local responses to specific geo-political circumstances (see below).

2.3 The nature of exchange: high, medium and low value goods

The exchange of goods, and with them ideas and knowledge, played a major role in the cultural, religious, and artistic exchanges that took place between Europe and Asia during antiquity. The long-distance movement of materials and goods involved trade, exchange, gift giving, and the payment of tribute. The latter considerations may have sometimes overshadowed material motives in the exchange of goods (Christian 2000, 3), but the Silk Roads undoubtedly facilitated the transfer of large quantities raw materials, foodstuffs, and luxury goods.

Silk was one amongst several high-value, relatively low-weight, goods that moved along the Silk Roads. Rhubarb, Spice, Musk & Tea - at various times all these commodities have been used to describe part of the routes - reflecting their importance. These high value goods certainly moved over considerable distances, exchanged from one merchant to the next.

The variety of high- or medium-value goods that moved through the Silk Roads networks was truly remarkable (see right) (e.g. Allsen 1997; Boulnois 2008; de la Vaissière 2002; Hansen 2012; Liu 1988; Liu & Shaffer 2007; Schafer 1963; Tucker 2003). Some of these relied on their manufacturing skill to create value, as with the Song dynasty ceramics (Kessler 2012), whilst many other commodities would have been shipped as raw materials, rather than finished goods: for example, the famous Damas steel, produced in Central Asia, was probably moved as ingots before being worked by craftsmen in Damascus (Feuerbach 2002a; 2002b).

Many have argued, particularly in the classical world, that overland trade was too expensive for low-value commodities (Garnsey et al. 1983; Garnsey & Whittaker 1998; Jones 1964, 841). While it is certainly likely

Periplus Maris Erythraei, a Greek work describing navigation and trading from Roman Egyptian ports to the Red Sea, North Africa and India, probably dating to the mid-1st century CE, described the many goods exchanged. At the market-town of Barigaza (modern Bharuch, Gujarat State) in India, for example, these included “wine, Italian preferred, also Laodicean and Arabian; copper, tin, and lead; coral and topaz; thin clothing and inferior sorts of all kinds; bright-coloured girdles a cubit wide; storax, sweet clover, flint glass, realgar, antimony, gold and silver coin, on which there is a profit when exchanged for the money of the country; and ointment, but not very costly and not much. And for the King there are brought into those places very costly vessels of silver, singing boys, beautiful maidens for the harem, fine wines, thin clothing of the finest weaves, and the choicest ointments. There are exported from these places spikenard, costus, bdellium, ivory, agate and carnelian, lycium, cotton cloth of all kinds, silk cloth, mallow cloth, yarn, long pepper and such other things as are brought here from the various market-towns”

(Casson 1989, Chapter 49).

that cities did not rely on long-distance trade to feed themselves, a more complex pattern of ancient economic activity is becoming apparent (Mattingly & Salmon 2000; Paterson 1998), including responses to risk and the movement of agricultural supplies (Decker 2009, 229-33). It is likely that not all the goods being moved were destined to be transported vast distances. Much of the material, perhaps the bulk of caravans, was probably shorter distance goods: bulkier, lower-value goods moving to regional markets.

It is probable that large parts of this were driven through the mechanisms of government and/or military supply (Duncan-Jones 1990, 49; Hansen 2012, 107-8), but there is also a greater understanding of carrying capacities and 'costs' (Decker 2009, 248-57). The scale of this movement, of domestic consumption rather than elite exchange, and the scale of social impact that this suggests, is currently becoming clearer from the archaeological evidence (Smith 1999). More work on the movement of materials such as ceramics (Khakimov 2011; Bernsted 2003; Henderson et al. 2005; Jenkins-Madina 2006; Kennet 2004), glass (Fuxi et al. 2009; Zorn & Hilgner 2010; Baypakov 2011; Carboni 2001; Henderson et al. 2005) and metalwork (Park & Voyakin 2009; Sevillano-López & González 2011) will help to build a more complex picture of this interaction and its scale.

The existence of dedicated merchants (Boulnois 2008; Decker 2009, 233-7; Whitfield 1999), and purpose-built market centres/bazaars (e.g. Bang 2008; Daryaee 2010; Morrisson 2012; Weiss & Westermann 1998), testify to the scale of activity along the Silk Roads. It is perhaps hard to see this as solely explained through small quantity high-value goods. Some have argued that, without the high-value and portable commodities, such as silk, there would have been insufficient profits to be made from other goods for the long-distance land routes to Central Asia and beyond to be sustainable. But "trade in silk did not happen in isolation but was built on a foundation of trade in other commodities, not all of it long distance and much of it already well-established. It would be misleading also to assume that all silk from China was for a Roman market" (Whitfield 2006). Indeed, "the demand for ordinary goods provides an explanation for the development, success, and long-term viability of regional trade networks. These ordinary goods—household furnishings, containers, and utensils—are valued for their social as well as for their functional content, where social content is expressed through decoration, form, and choice of material type. The use of goods in social interactions provides a way for individuals to proclaim their group identity; this identity is a key factor in creating and maintaining social bonds within a group" (Smith 1999, 109).

The scale of these interactions also impacts upon the nature of the networks and polities that were created (for example, see McLaughlin 2009; or Young 2001). Andrew Sherratt (2004, Fig 2), for example, examined a core, periphery and margin model that explored the scale and nature of interactions.

Nevertheless, it may be that trade in high-value commodities is the best explanation for the creation of sufficient wealth to fund some of the major outcomes of the Silk Roads, such as the impressive sacred sites. At the Mogao Caves, for example, Susan Whitfield argues that: "Dunhuang was not a large town and the basic livelihood for its long-term residents was agriculture, unlikely to have resulted in more than a subsistence income for the farmers. There was no known large-scale industry, nor any local mineral wealth. Yet the caves and locally produced paintings on silk and manuscripts on paper were expensive to produce and the colophons and inscriptions show that local people and rulers were among their major

patrons. ... Wealth would also have been created by the services needed to accommodate, feed and entertain passing merchants” (Whitfield 2006). It will be interesting to see how these issues can be reflected in the selection of sites for nomination.

2.4 Geographical scope

This study focuses on the **land routes** (Figure 1). The Silk Roads spans such a large geographic expanse (Figure 2), and a long chronological timeframe, that it presents some significant problems with scale and resolution.



Figure 2. The broad study area (in green), covering some 25 million km².

Clearly the land and maritime routes were interlinked, especially through the interaction of entrepôts and terrestrial routes bringing material to and from the ports, but there were also a number of basic differences: the maritime routes developed later, and profoundly impacted on the significance of the land routes; the two route-systems required fundamentally different infrastructures; they enabled very different goods to be transported; and very different political and economic organisations grew up to exploit them.

An exception to this is short sea routes, for example between Korea and Japan and mainland China, or across the Caspian Sea between Turkmenistan and Azerbaijan. These were not about linking into the long seaborne journeys of the ‘Spice routes’ that were to be so important in the later periods, but rather about short sea crossings that enabled these areas to connect to the main land-based networks of the Silk Roads. In addition, the exploitation of water-borne transport in places was inter-linked with the ‘land routes’, as in the movement of people and goods along the Syr Darya in Central Asia.

The study focused on a broad zone of movement from China to the Mediterranean through Central Asia, but extending southward to encompass the crucial routes connecting South Asia with this zone (Figure 3).

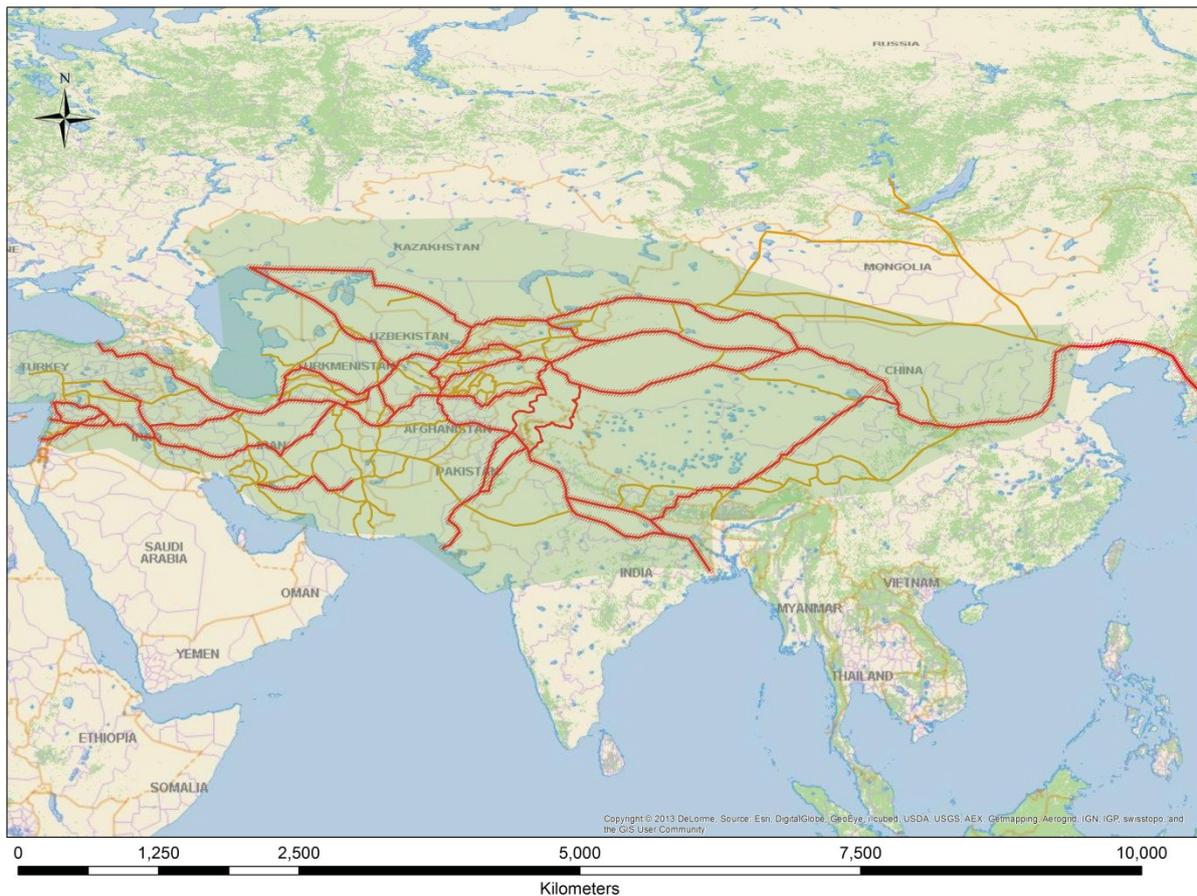


Figure 3. The study area (green) with major (red) and other significant (orange) routes.

For the purposes of this study we initially took the **east-west extent** to be Chang'an (modern day Xi'an in China) to the Eastern Mediterranean (e.g. Antioch in modern day Turkey). This is a distance of 6,461km (Figure 4), but closer to 7,250km by the shortest practical route (Figure 5). There is no doubt that the study could be extended westward, through Turkey to Istanbul, and on to Italy; or eastward, to Korea and Japan (Nara lies some 8,700km from the eastern Mediterranean). However, as a start, this was considered a sufficiently broad study area.

Defining the **north-south extent** of the study was also problematic. As already noted, the complex exchange and movement patterns of the Silk Roads includes considerable movement north-south as well as east-west (section 2.2). To practically constrain the enormous scale of this study it was decided to restrict the northern extent to routes along the Tian Shan mountain piedmont and along the major river systems of the Syr Darya and Amu Darya: this effectively excluded the so-called 'steppe routes' further north (Bálint 1989), which means that the routes through Mongolia⁹ and northern Kazakhstan, for

⁹ "For a time in the mid-thirteenth century the Mongol capital of Karakorum, deep in Mongolia, was the most important single stopping point on the Silk Roads." (Christian 2000, 18)

example, have not been explored. Similarly the study did not extend northward into Armenia, Azerbaijan, etc. or cover the areas north of the Caspian or Black Seas, although these are clearly relevant.

There has also been no attempt to extend southward in the Mediterranean zone, to include Jordan, Palestine, etc., despite the obvious trade routes radiating through these regions and into Africa (e.g. Mattingly 2013).

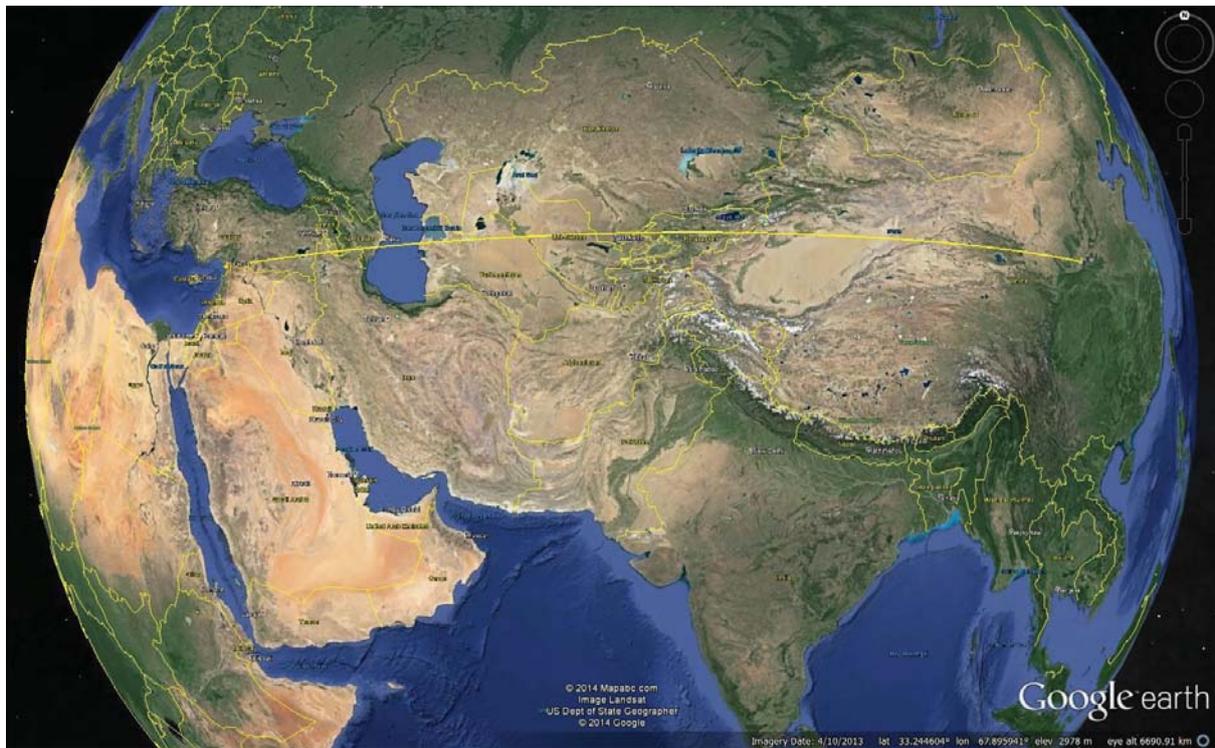


Figure 4. Chang'an (China) to Antioch (Turkey): 6,478 km 'as the crow flies' (Google Earth image Landsat © Orion-ME 2014 © Google 2014 [accessed April 2014]).



Figure 5. Chang'an in China to Antioch in Turkey, by perhaps the most direct route taking into account geographic obstacles: closer to 7,250 km (Google Earth image Landsat © Orion-ME 2014 © Google 2014 [accessed April 2014]).

Even given these limitations the current *area encompassed* within the study comprises some 25 million km² (Figure 2), and within this area we have mapped over 75,000 km of significant routes (Figure 3; sections 5.1 and 6.1).

2.5 Chronological scope

There is evidence for long-distance trade from the 4th millennium BCE; for example, lapis lazuli from the Chagai mountains, in modern-day Pakistan, was traded 2,000 km to lowland Mesopotamia (Sherratt 2004), and by c 2500-2000 BCE a web of trade routes connected the cities of the Mediterranean with those in western India (Tomber 2008). From mid-3rd millennium BCE onwards there were also complex movements of agricultural crops (Fuller 2009; Spengler et al. 2014). By the 6th century BCE onwards there is evidence of the movement of some goods between China and the Mediterranean zone (Christian 2000, 5-6).

However, quantitative change seems to have occurred in the last centuries of the 1st millennium BCE, with sustained exchange/trade across the Central Asia region, linking China with these pre-existing Afro-Eurasian exchange networks. I would also argue that there is a qualitative change as well – away from socially-embedded exchange dominated activities and towards trade.

During the reign of the First Chinese Emperor, Shi Huangdi (reigned 221–210 BCE), policies were developed that began a new era of more frequent and longer journeys (Gosch & Stearns 2008). From the 2nd century BCE, China was unified under the Qin and then particularly the Han rulers. This coincided with, and was probably in part a response to, the unification of many of the northern nomads in the Xiongnu (Hsiung-nu) confederation.

Emperor Wudi augmented this by dispatching Zhang Qian on a mission to Central Asia in 138 BCE, thereby opening up further contacts.

The Silk roads gained momentum in the 1st BCE to 3rd century CE with four contiguous empire systems - the Roman, Parthian, Kushan, and Han – along with the nomadic confederation of the Xiongnu, developing long-term connections. The latter are significant, as the interactions between nomadic and settled agricultural communities was an important component of the dynamics of the Silk Roads throughout its history. The relationships between major civilizations, and between these and complex nomadic societies, is woven into the processes of empire creation and destruction along the Silk Roads. These relationships were not static and fluctuations in connections sustained and changed societies and empires fortunes.

Activity peaked in the 8-9th centuries CE, once again with large empires across its span aiding the process: including the Islamic empires of the Middle East and Central Asia, the Tang Dynasty in China, and the Byzantine Empire in the Mediterranean. From about this time, however, seaborne trade from ports in Fujian and Guangdong began to flourish. Nevertheless, the Silk Roads experienced another surge in activity under the *Pax Mongolica* in the 13th and 14th centuries CE, but the importance of the land routes declined again after the break-up of the Timurid Empire in the early 16th century CE, with the seas routes becoming dominant. They never entirely died; indeed, the quantity of Chinese goods still transported to this day overland into Central Asian markets is evidence of this.

2.6 Geography, climate & vegetation

2.6.1 Ecological zones

The area of the Silk Roads encompasses a wide variety of topographic, hydrographic, climatic and ecological regions, including the physical and climatic zones of mountain, steppe, grasslands, deserts, river valleys and deltas (Figure 6). These geo-ecological zones lay at the core of some of the most important Silk Roads interactions, and their significance is reflected in the naming of sections of the route; such as the grass route, the steppe route, and the oasis route. These factors had a significant impact upon the nature of the routes: including the specific choice of routes (mountain passes, desert margins, river crossings, etc.), the seasonality of routes, and the ability to sustain major population centres along the routes. The “trans-ecological” nature of the routes (Christian 2000, 22) may have also been of major significance, providing an impetus for the movement of goods and materials between different zones. Silk Roads empires and societies adapted to the ecological context of regions, but they also exploited the contrasts between them to develop long-distance exchanges.

Defining geographic and ecological regions within the Silk Roads is a complex issue, accentuated by changing climate, hydrology and ecology over time. However, a fundamental issue has always been access to water: both directly to sustain life and to irrigate pasture and crops to support the development of populations. Significant populations were supported, both in a dispersed form in the grasslands and in sedentary concentrations in the oases, river valleys and deltas. Recent research has highlighted the close interaction between pastoralists and agriculturalists (Waugh 2008).



Figure 6. The diversity of ecological and topographic zones that the Silk Roads passed through.

There were also significant fluctuations in temperature across these zones: within major seasonal variations days, and significant daily fluctuations.

2.6.2 Topography

The high mountains, such as the Pamirs, the Altai and the Tian Shan, and the extensive deserts along the routes (Figure 7), were formidable obstacles to travellers. There were significant variations in elevation, which is seldom considered except in the context of mountain passes. For example, the route from Anxi to Kashgar through the Turfan depression would have required a significant climb c 1,400m.

2.6.3 Hydrology

Central Asia is a region of interior drainage, with steppes and mountains, desert floodplains (Turania) and their surrounding borders (Caspian Sea and Kopet-Dag, Pamir, and Tian Shan mountain ranges) (Lewis 1965). “The entire region is in the process of progressive aridization, which started with the middle Pleistocene and continues to the present, with occasional minor wetter phases between 1400-1000 BCE, 600-250 BCE, 900-1200 CE and 1600-1800 CE” (Sala 2003, 3).

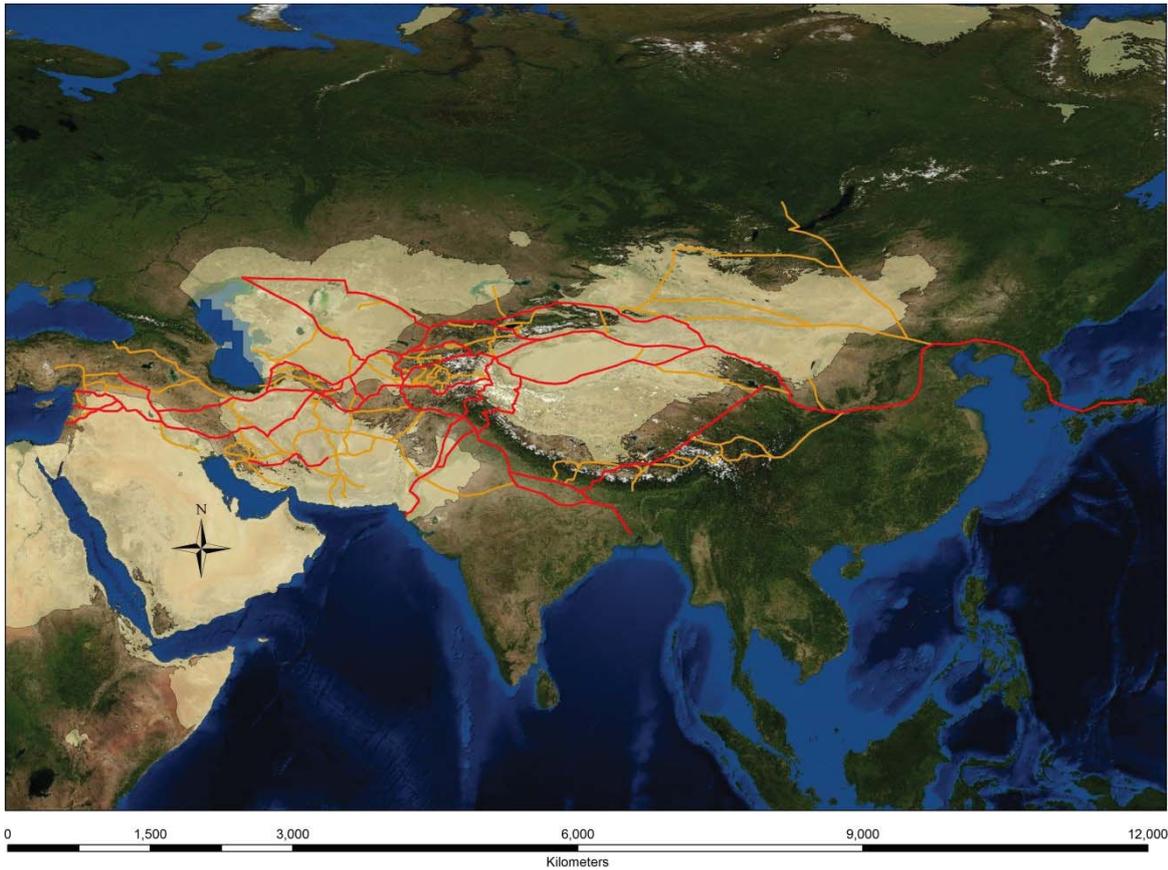


Figure 7. The major desert areas along the Silk Roads. Even here, there is a complexity of desert forms, from the high plateau deserts surrounded by chains of high mountains, such as the Gobi, the Djungarian, and the Taklamakan, as opposed to the lowland dunal deserts such as the Karakum.

The climatic conditions mean that “dry farming can only be implemented in a narrow band of the middle mountain zone (between 800 and 1700 m) of the Kopet Dag, Pamir and Tian Shan ranges, where precipitation is mainly in the form of rain, averaging yearly 500-700 mm and peaking in winter and spring. ... In spite of the arid climate of the Turanian plains, the surrounding high mountain ranges of Kopet-Dag (max 2900m), Pamir (max 7000 m) and Tian Shan (max 7000 m) act as collectors of precipitation, mainly in the form of snow and ice, which is discharged by a few rivers across piedmonts and desertic flood plains down to interior reservoirs. ... Even in desertic lowlands with yearly precipitation less than 50-100 mm, basins seasonally moistened by floods exist along the lower course of small piedmonts streams and around mild distributaries of deltas of the large rivers” (Sala 2003, 3). Importantly, however, “perennial and seasonal streams, with peaking regimes in spring and summer, make the irrigation potential of Middle Asia very high, the water being sufficient for the reclamation of vast areas for agriculture” (Sala 2003, 3-4).

Tolstov and Andrianov (Tolstov & Andrianov 1957), in their reconstruction of the water systems in the Amudarya and Syrdarya deltas, identify a period of maximum development between the 4th century BCE and the 2nd century CE. They estimate that a total of 2 million ha was being irrigated in the two deltas; half with small basin schemes, the other half by permanent reservoirs (4 times the area currently under permanent irrigation). These represent an example of the outstanding adaptation of local conditions to support the cities

of the Silk Roads. Sala (2003, 3-4) established a variety of basic geo-hydrological conditions and landscapes:

Irrigated landscapes:

- along piedmont streams
- around lowland river deltas

Stream fed water regimes:

- fed by water deposits (springs, ice): depending on stored waters, these are characterized by stable water discharges throughout the year and by non-destructive transgressions: their stability makes them of easier to exploit.
- fed by precipitation (snow, rain): they depend on climatic conditions which result in tremendous variations in discharge throughout the year and year-on-year. They also tend to destructive mudflows. Their control requires more labour and a greater skill-base. Example: Hissar, Surkan-Darya and Kafirnigan rivers (Dyakonov 1953).

Each of these situations requires different hydrological management and different irrigation techniques.

3 Issues

3.1 Scale of the overall study

This study is a synthesis of existing information: it was necessarily a broad sweep and so undoubtedly there are many inaccuracies – including mis-located sites - but sufficient to establish broader patterns. The work was intended to act as a platform for more informed local researchers in the countries to add material and refine misunderstandings. As such it should be seen as very much a work in progress: it aims to provide a framework for debate, discussion and addition.

3.2 Scale of existing mapping

There have been many attempts at mapping the Silk Roads, often at a very broad scale, with many thousands of kilometres reduced to a single page in a book. The recent excellent map by Odyssey (2011), for example, reproduces the whole route at a scale of approximately 1:19,000,000, with detailed maps of three zones, each at approximately 1:12,000,000. Most maps in books are at considerably larger scales. In these cases mapping at this scale need not involve more than joining the dots, from one major city to another. Necessarily such maps also have to reproduce rather generalised courses for the routes, often roughly straight lines between one major nodal city and another, with relatively little ability to reflect the subtlety of landscapes (except major mountain passes) or the impact of the location of minor settlements and way-stations.

Very occasionally more detailed regional studies have produced more detailed maps of suggested routes (e.g. Baipakov & Pidayev 2011 in Central Asia; Dussaud 1927 in Syria; Freeman & Ahmed 2011 for the Tibetan area; Siroux 1949 in Iran; Wood 2002 for the area around the Taklamakan).

For this study, despite the scale of the landscape involved, it was felt that we needed to attempt to provide more accurate locations of sites, and more detail of the complexity of the routes. There were a number of reasons for this:

- i) The questions as to the distinctive nature of the routes would require a degree of confidence about the association of place, and route, with wider landscapes and ecology.
- ii) That State Parties would wish to be able to explore routes at a more local (higher resolution) scale, considering the inclusion of sites and landscapes.

This has significant implications for the way that we have approached plotting the routes in the GIS mapping of the Silk Roads for this project – see section 5.1.

3.3 Sites included - and omitted

There is a problem that extensive national inventories, for many of the countries along the routes, are not easily accessible. This means that it is very difficult to construct a picture of the range and diversity of surviving sites and we have to rely on accessible published sources. Given the scale of this study, inevitably there is a bias towards the more well-

known and substantial sites (perhaps arguably the more significant sites) that have been identified and collated by regional, local and thematic surveys.

This introduces a number of variables and biases into the study:

- Areas for which there are published detailed regional surveys or inventories, such as the caravanserai of Iran (Siroux 1949), were better represented in the data. This may also be reflected in a greater complexity of mapped routes in these areas.
- Conversely, those areas that have not been well-studied may appear as 'blank', or less intensive areas. In some cases this may be accurate, but for many others this may simply reflect the state of archaeological knowledge. For example, the upper Chuy Valley in Kyrgyzstan, or the routes through western Nepal – in both of these areas there are undoubtedly many more sites and routes, representing far greater complexity than it is currently possible to reflect on the basis of published data.

3.4 The quality of information on sites and their dating

Comparatively few sites along the length of the Silk Roads have been well explored archaeologically. Indeed, a great many lack even basic surveys, let alone an understanding of sequence, buried deposit survival, dating, etc.

The quality of dating evidence in particular is very variable along the routes, and often oversimplified in the published accounts. Not only is there a paucity of excavated sequences, but work on regional ceramic typologies, across much of the region, is still in its infancy. This, combined with a lack of absolute dating, means that many sites have vague chronologies, often based around historical accounts. A particular problem is the foundation dates for many deeply stratified cities, which may be considerably more complex than currently presented. Furthermore, published summaries tend to highlight major phases/periods of occupation, often omitting other activities and so not providing a definitive presence/absence record.

As a result, we need to be careful that we are not simply selecting the 'well-studied' and under-estimating the potential of many other sites. Overall, it is likely to be much more subtle and complex process of development than we are currently able to articulate.

3.5 Site locations

Many sites lack accurate locations. In part this is due to the scale of maps that the sites are published on (see 3.2) and partly the lack of recent survey. The advent of cheap handheld Geographic Positioning Systems (GPS) systems is likely to significantly improve this in the coming years.

In the short-term, however, it has been possible to use widely available satellite imagery to improve the location of sites. Where high-resolution imagery (1m resolution or better) is available via Google Earth it has been often been possible to identify specific sites and provide a more accurate coordinate. However, some sites fall in areas with only broad scale imagery (10m+ resolution), while in other cases it is not always clear where the ancient site lies beneath modern settlements. Where new coordinates have been suggested for sites

(and used in the mapping for this project) this is recorded in the project database (see Annex 4.2 & 4.3.7.3).

3.6 Place names: ancient & modern

Many places have been known by multiple names, and in multiple languages - Turkic, Chinese, Arabic, Hindi, Persian, Latin, etc. Many place names have changed over time, with some historic names not securely located to modern places. There are also often variable spellings of modern place names, with different customs and transliterations. This can lead to considerable confusion over the association of places with specific locations, both ancient and modern.

Different State Parties have adopted different approaches to using ancient or modern names to identify sites. In general, the project has adopted the name and spelling used by the State Party, with other names recorded in the database (see Annex 4.2). There are issues in terms of the future development of this database (see 7.3.5.3).

4 Preparation of a Geographical Information System

4.1 Introduction

To assist in exploring the spread and range of sites along the Silk Roads a Geographical Information System (GIS) was established for the Thematic Study (see Annex 4 for details). This was necessarily a rapid exercise, largely drawing upon existing data sources, although not all of these were available digitally and time was spent digitising some material from existing maps and publications.

The aim was not to provide a massive new database on the Silk Roads, but rather to draw attention to the existing sources of material and use these to help understand the range and diversity of the sites along this massive and complex set of routes. It would be useful, in the future, to establish a portal to provide links to this data, and to develop and adopt standards for the geo-referencing, naming and information sources (for example, see Ciolek 2006). These issues are considered further in section 7.3.5.3.

4.2 Data sources

Data has been combined within the GIS from a variety of sources, including published works (4.2.1), historical accounts (4.2.2), Tentative Lists (4.2.3), published maps (4.2.4), and online data (4.2.5).

In addition, a variety of other digital datasets were also drawn upon as part of this study, covering climate (4.2.6), ecology & hydrology (4.2.7) and topography & physical data (4.2.8). Selections of these data sets have been added to the GIS to provide base-maps or to help with the characterisation of sites by landscape/climatic/ecological zones.

4.2.1 Published works on the Silk Roads

The research drew upon a wide range of existing published material, in the form of books, journal articles, conference proceedings, etc. (see Annex 5). This was largely collated from international sources and is dominated by works in the English language, although it includes some key texts in French, German, Italian, Russian, etc. This was supported and enhanced by the State Parties supplying bibliographies of key works relating to the Silk Roads in their country. Bibliographies were received from Afghanistan, India, Iran, Japan¹⁰, Kazakhstan¹¹, Kyrgyzstan¹², Republic of Korea, and Uzbekistan¹³. In addition, a number of internet resources were used, generated by Universities, research institutions, and special interest groups.

4.2.2 Historical accounts

Many historical accounts of the Silk Roads exist:

“For instance there are over 70,000 extant manuscripts for the Chinese section of the Eastern Silk Roads alone including diplomatic and military reports in the Chinese

¹⁰ In Japanese and not yet translated.

¹¹ In Russian.

¹² In Russian and translated by the project into English.

¹³ In Russian and translated by the project into English.

written histories of the period. Hundreds of Buddhist monks from China made pilgrimages to India to bring back sacred texts, and their travel diaries are an invaluable source of information. The diary of Fa Xian, for example, describes a 14-year voyage between 399 and 414, whilst the 25 year journal of Xuan Zang lasted from 629 to 654. There are also accounts by Persians and Turkic travellers of the period. The Arab traveller 'Ibn Battutah was in Balkh and Samarkand in the mid-14th century. The most readable account of the trade in silk and its preparation is to be found in Marco Polo's account of his travels in China and its neighbouring countries from 1271 to 1292. Other 13th century European visitors were Giovanni da Pian del Carpine, sent by Pope Innocent IV in 1245–47, and William of Rubruck, a Flemish Franciscan monk sent by Saint Louis from 1253 to 1255. In addition to these accounts, there is a vast treasury of archaeological artefacts, including tens of thousands of manuscripts in over twenty languages and scripts and hundreds of inscriptions." (UNESCO 2008a, 7-8)

For details of these references see Moore & Wendelken (2010). For a discussion of Han sources see Hill (2009).

4.2.3 State Party Tentative Lists

The original core group of countries, the five Central Asian countries and China, have all produced Tentative Lists focused upon the specifics of the Silk Roads. Of the countries joining the programme subsequently only India has been able to produce a Silk Roads Tentative List, although Iran has flagged up the intention with a broad Silk Roads Tentative List entry (Table 1).

	Submitted TL	Date submitted	Total number of sites	Detailed site descriptions
China	✓	28/03/2008	46	✗
Iran	✓	05/02/2008	?	✗
India	✓	20/01/2010	12	✓
Kazakhstan	✓	05/03/2012	31	✓
Kyrgyzstan	✓	19/02/2010	14	✓
Tajikistan¹⁴	✓	15/01/2013	8	✓
Turkmenistan	✓	01/03/2010	29	✓
Uzbekistan	✓	19/02/2010	18	✓
All			158	

Table 1. Summary of current status of State Party Silk Roads Tentative Lists.

¹⁴ The Tajik Silk Roads TL was originally submitted in June 2010, but did not appear on the UNESCO World Heritage Centre website, although some of the individual sites, which were already on the Tentative List, did. The full list was added in 15/01/2013.

Afghanistan, Iraq, Lebanon, Nepal, Pakistan, Syrian Arab Republic and Turkey have not yet submitted a Tentative List for specific Silk Roads sites. However, where existing Tentative List sites fit the chronology and geographical scope of the Silk Roads study¹⁵, they have been included (Annex 2).

4.2.4 Published map data

In addition to digitally available data (see 4.2.5 below), there have been a number of conventionally published maps encompassing the Silk Roads. While most are not particularly detailed, some do provide good overviews (e.g. Odyssey 2011) or more detailed accounts of specific areas (e.g. Goskartografia 2002).

One of the most useful sources for Silk Roads data is the *Historical Atlas of Central Asia* (Bregel 2003) whose collated maps form an excellent basis for further investigation. Bregel defines a number of specific routes between sites, allowing for comparison with other delineated maps of the Silk Roads.

The *Barrington Atlas of the Greek and Roman World* (Talbert 2000) is a major source of information on the classical and late antique world. It also provides the basis for the Pleiades digital project (see below).

There have also been detailed maps of specific areas or topics, such as *The archaeological map of Iraq* (Directorate General of Antiquities of Iraq 1967) or the amazing survey by Maxime Siroux of the Caravanserai of Iran (Siroux 1949).

In addition, some books have produced detailed maps of segments of the routes (e.g. de la Vaissière 2005; Tucker 2003; Wood 2002).

Some of these maps have been scanned, or information from them digitised, to form part of the GIS platform (see Annex 4.3 for details).

4.2.5 Digital data sources

A variety of digital resources have been gathered together for the Silk Roads project. Full details of the material collected, and its availability, is provided in Annex 4.3.4.

The most important sources were:

- Historical Atlas of Eurasia Online (Annex 4.3.4.1)
- Digital Silk Roads Project (Annex 4.3.4.2)
- The Old World Trade Routes Project (Annex 4.3.4.3)
- ArchAtlas (Annex 4.3.4.4)
- Silk Roads on Google Maps (Annex 4.3.4.5)
- Ancient Cities DataBase (Annex 4.3.4.6)
- Pleiades (Annex 4.3.4.7)
- Project HESTIA (Annex 4.3.4.8)

¹⁵ For example, in Turkey: Konya, the 12th and 13th century capital of the Seljuks, and the Seljuk caravanserais on the route from Denizli to Doğubeyazit.

-
- The International Dunhuang Project at the British Library¹⁶
 - The threat to world heritage in Iraq (Annex 4.3.4.9)
 - UNESCO World Heritage List 2010 (Annex 4.3.4.10).

Most of this data is freely available online. Where appropriate copies are provided as part of the data distribution in support of this Thematic Study (Williams forthcoming a). Some of the information platforms, such as the excellent OWTRAD *Electronic Atlas of Buddhist Monasteries*, are also linked to online data platforms (in this case, a very good Wiki site <http://monastic-asia.wikidot.com/>): in these cases there has been no attempt to download all of the data but rather users are directed to the online resources (see Annex 4.3.4 for details).

4.2.6 Climate data

The frequently used Köppen climate classification system (the most commonly used version is the 1961 edition by Rudolf Geiger, and thus referred to as the Köppen-Geiger system) is based on the concept that native vegetation is the best expression of climate. Climate zone boundaries were selected on the basis of vegetation distributions, and the system combines average annual and monthly temperatures and precipitation, with the seasonality of precipitation (McKnight & Hess 2000, 200–1).

Based on recent data sets from the Climatic Research Unit of the University of East Anglia and the Global Precipitation Climatology Centre at the German Weather Service, a new digital version of the Köppen-Geiger world map of climate classification for the second half of the 20th century has been produced (see Annex 0 for details).

There is also a range of detailed contemporary information available at *WorldClim - Global Climate Data* (see Annex 0).

4.2.7 Ecological and hydrographic data

Some basic data was collected to examine broad scale ecological data. Most of the available data works best at a regional or local level, but some broader attempts have been made to characterise ecological zones. Given that the development of the Silk Roads clearly reflected adaptations to ecological and climatic circumstances, and that the civilizations that flourished along the routes did so in a dynamic relationship to such zones, it is interesting to explore these wider relationships.

There are basic problems with this, not least that changing irrigation systems and climatic changes have radically altered the distribution and scale of crop and pasture land within the study area. Thus extrapolation from modern landuse data is problematic.

The best available large-scale data is the *AS cropland & pasture* data (Ramankutty et al. 2008), which gives a broad pattern for crop land and pasture in the year 2000 (see Annex 0 for details). Obviously this is not directly readable on to the complex development of the Silk Roads landscapes over the past two and a half millennia, but nevertheless it does give a feel for the broad ecological zones of fertile arable land, pasture land and desert landscapes.

¹⁶ Although no specific GIS data the resources were very helpful, especially regarding sites explored by Stein in the Taklamakan Desert: see <http://idp.bl.uk/>

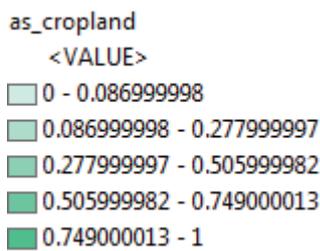
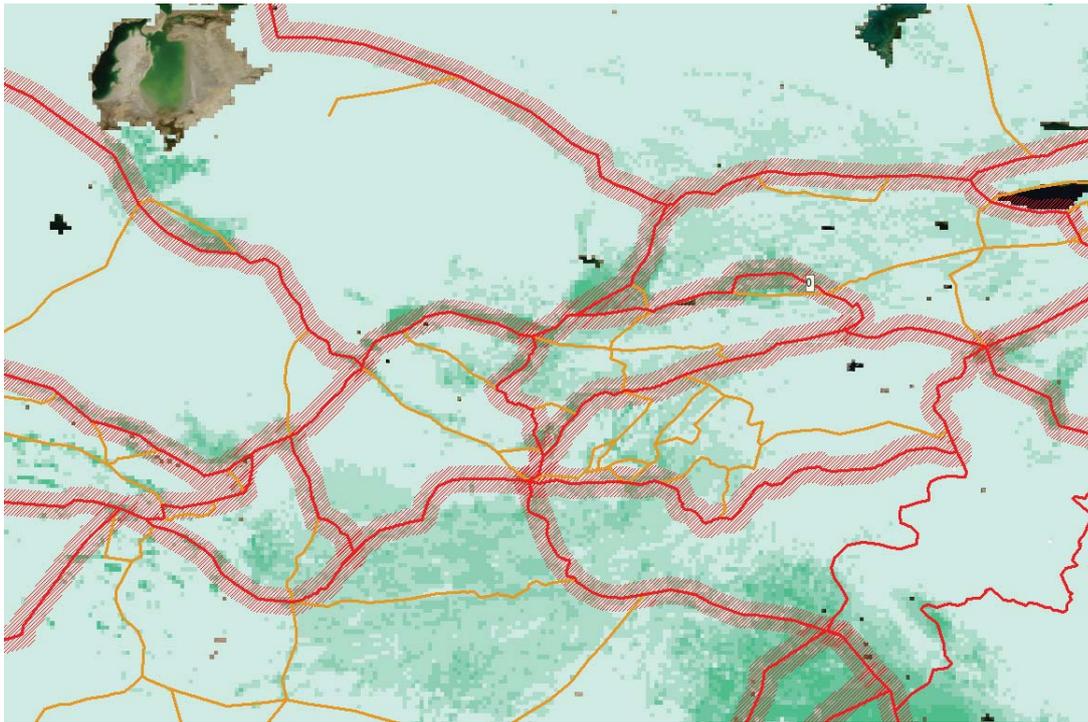


Figure 8. A portion of Central Asian routes against a backdrop of the AS cropland data.

General characterisations of deserts (see Annex 4.3.6.6) are also useful in understanding the broader patterns of the Silk Roads.

There are also data sets of hydrology, such as *World Linear Water* (see Annex 0) represents the narrow rivers and streams of the world, and *World Drainage Systems* (see Annex 0) which represents major water catchment areas.

4.2.8 Topographic & physical geography

Within ArcGIS (the software used by the project – see Annex 4.3) there are a number of freely available base maps which provide a variety of physical topographic data, at a variety of resolutions (see Annexes 4.3.5 and 4.3.6). The maps used in the compilation of this report primarily used ESRI ArcGIS online *World Imagery* (Annex 4.3.5.6), under a Creative Commons Attribution Non-commercial Share Alike License.

The project also used the *DeLorme World Base Map* (Annex 4.3.5.7), *World Shaded Relief* (Annex 4.3.5.4), *World SRTM* (Annex 4.3.6.1), and *World Elevation contours* (Annex 0) along with some reference overlay data, such as *World reference overlay* (Annex 4.3.5.2), *World Boundaries and Places* (Annex 4.3.5.3).

Furthermore, there are some useful reference layers of modern cities, such as *World Gazetteer* (Annex 0) and *World Cities* (Annex 0).

5 Conceptual approach to mapping: nodes, route segments & corridors

5.1 Mapping the routes

The advantage of a computer-based mapping system, over maps reproduced in books and wall charts (section 3.2), is that it is extensively scalable, thus enabling the researcher to zoom into a very detailed exploration of one small segment of a larger route. Thus it would be possible to zoom in to examine a route entering a specific gate within a city, or which side of a river the route ran along. For the purposes of this study, however, it was not possible to drill down to such a local level for tens of thousands of kilometres of routes; to make suggestions regarding every alternative ford or river crossing, every possible deviation and alternative, would be many years work and in most cases unfeasible without local knowledge. This level of refinement must await local research.

There are also some significant conceptual problems with drawing a single route:

- In some areas, especially extensive fertile zones or wide areas of grassland, there were probably a number of alternative routes through the landscape; all still negotiating the passage from node A to B.
- Paths may have changed, both over the centuries and seasonally: for example, fording a river at a different point depending upon whether it was the wet or dry season.

For this study, therefore, we adopted the approach of identifying major **nodes** (large cities) along the Silk Roads; identifying **segments** of routes between these; and broadening these out to represent the **corridors** of ‘movement and impact’ that took place between the nodes (rather than suggesting specific ‘roads’).

5.2 Definitions: nodes, route segments & corridors

5.2.1 Node

Node: a major urban centre and usually a place where a number of routes intersect. These centres are likely to have played an important role in administration, re-supplying, redistribution/marketing, and production; and in reflecting the outcomes of the Silk Roads in terms of architecture, arts, society and beliefs.

There were difficulties in systematically selecting nodes:

- It was not easy to select cities simply on the basis of their **size**; in part, because we have too little data on many of them to be sure of their size at any given moment in their histories; in part, because size relates to other aspects of urbanism: functions; agriculturally productive capacity of the hinterland to support the population; scale of production/access to raw materials; ideological significance (ruler’s home town, major religious connections); etc.
- It is also problematic to select cities solely on the basis of the **number of connecting routes**: some major cities developed because they control a limited number of route

options through a region (e.g. Merv with its strategic position in the Murghab delta controlling routes from the Oxus to the northern Iranian plain – there were few other routes and none as direct).

These issues with the selection of nodes leave us with a number of choices regarding how to segment routes; broadly the three models are:

- Selecting long segments, between nodes at major ('mega') cities. Selecting major urban centres for the nodes has the advantage that it is likely that most of these have already at least been identified and in many cases there has been some archaeological work in developing their chronologies;
- Splitting routes into numerous segments between each reasonably large town;
- A combination of using urban size and route connectivity: focusing on substantial urban centres that also act as inter-connections between routes.

See Figure 9 for an example of the approaches.

EXAMPLE: *the route from Loulan to Khotan around the southern margins of the Taklamakan Desert, a distance of just short of 1,000 km.*

In *model (i)* this might be considered to be a single corridor between two very major cities.

In *model (ii)* Charklick to Khotan segment could be broken down, at Waxxari, Charchan, Endere and Niya (so a total of 7 segments between Loulan and Khotan). The problem with model (ii) is that we know very little about these smaller towns (indeed, in some cases, even their location is disputed), and if we adopted this approach, we would end up with many hundreds of segments along the Silk Roads.

In *model (iii)* we would have three segments¹⁷: Loulan to Miran (c 170 km); Miran to Charklick (c 70 km); and Charklick to Khotan (c 740 km): each a substantial settlement, and each acting as intersections of major route junctions.

¹⁷ Which is effectively what OWTRAD adopted, based on Whitfield's work (1999).

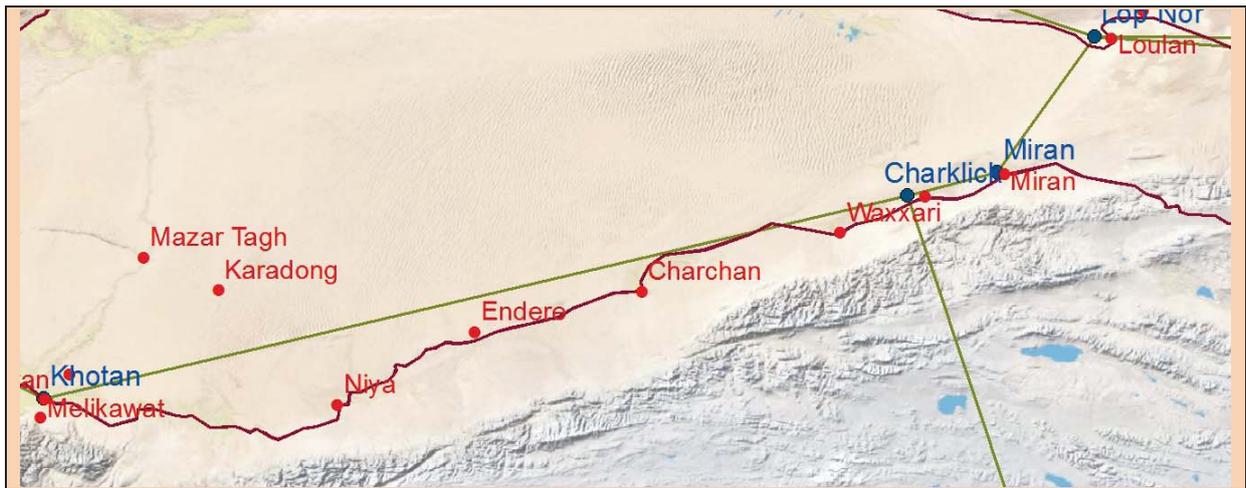


Figure 9. Selecting nodes and segments. The principal sites between Khotan (left) and Lop Nor/Loulan (right). The green lines are the segments identified in the OWTRAD dataset, and simply link nodes with straight lines. In red, a more complex picture, with more settlements and a route digitised to reflect local topography (rivers, oases, etc) (from the Historical Atlas of Eurasia).

Model (i) might seem to offer the best approach at present – given the tremendous scale of the project, the fact that the major nodes are more likely to have been identified, located and (at least partially) documented - combined with the concept of the junction of major routes. Of course, segments can be grouped together, or split, in terms of selecting corridors for inscription (see 7.2.3).

5.2.2 Segment

Route segment: the route between two major nodes, taking into account known topographic and cultural features (see 5.3 below on how these were digitised). For example, in Figure 9, the red route reflects the complexity of the route utilising the rivers and oases of the region. The routes defined are not trying to reflect every path and track, but rather provide insight into major movements of people and goods.

5.2.3 Corridor

Corridor: a uniform buffer applied to all the digitised route segments. This is intended to cope with the potential variability of specific paths and roads between the nodes, and to capture sites/landscapes along the segments: the latter reflecting the impact of the route in terms of the development of way-stations, forts, bridges, smaller towns, religious sites, etc.

We tested a variety of buffer sizes against the known sites recorded in the GIS and a buffer of 30km on either side of the route segment (i.e. a 60km wide corridor) worked most effectively in capturing most key elements¹⁸.

The process of buffering the route segments also highlighted places where groups of sites lay outside any designated corridor, suggesting the presence of subsidiary routes that had not been identified from other sources.

¹⁸ It is a simple operation in the GIS, using ArcMap, to change the size of the buffer to model alternative patterns. A buffer of 2km was used by Del & Tavernari (2009) when exploring caravanserai routes, but the purpose here is to capture a more complex set of movements and impacts through the landscape.

5.2.4 Adapting the corridor buffer

What will be needed in the future is the local refinement of the generic 30km buffer, replacing it with a more considered boundary polygon encompassing the specifics of the individual segment (Figure 10). This will be particularly relevant if we use a selection of corridors to drive forward the nomination strategy (section 7.2).

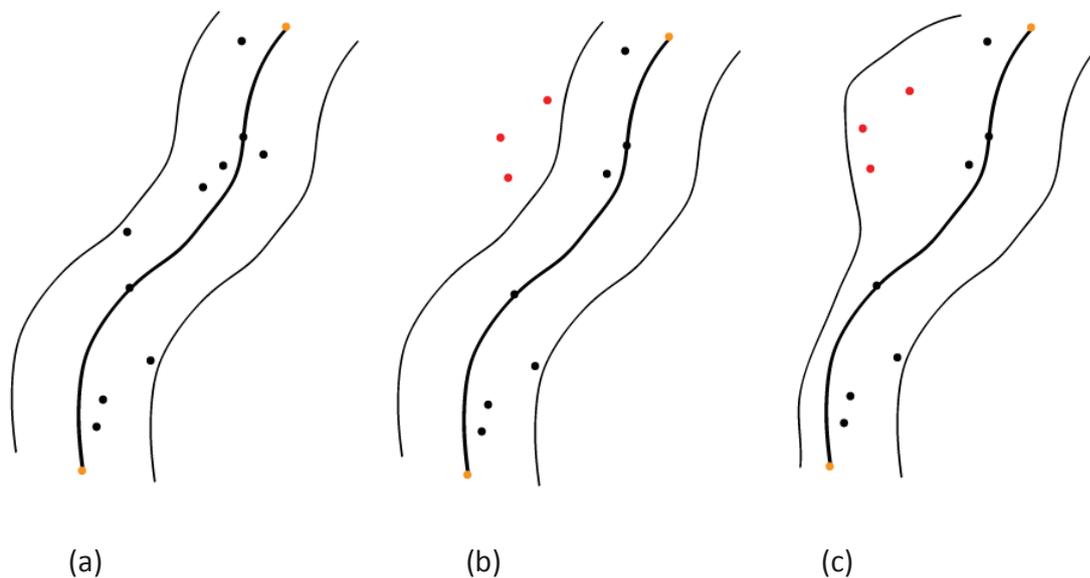


Figure 10. Adjusting the boundary of specific corridors. In (a) all the principal sites lie within a corridor defined by a generic buffer 30 km to either side of the main segment defined between two nodes (yellow). In (b) some sites (in red) lie outside the corridor. In (c) the buffer is redrawn to take into account the local topography/ecology – which constricts the landscape available in some places, and broadens it out in others.

5.2.5 Conclusions

Obviously this is a relatively coarse approach: it cannot take into account all of the subtleties of local topography, environment or vegetation, and undoubtedly local knowledge and research will add to, and deepen, this picture. However, this was a viable approach when dealing with in excess of 50,000 km of routes. We would argue that it creates a reasonably robust tool, in terms of identifying key elements of the overall Silk Roads and patterning their diversity (section 6.1).

5.3 Digitising routes

We digitised the routes at an approximate scale of 1:25,000.

In drawing the routes we took account of obvious topographic features (mountain passes, well-known fords and river crossings, known bridging points, etc.), along with known way-stations, forts, and smaller towns. Major shrine complexes were also taken into account, although it is also clear that these were sometimes located off the main routes of movement, perhaps taking advantage of the siting (on a hill or mountainside overlooking such routes), or reflecting the specific desire for remote locations.

6 Analysis

The aim of this study is to provide an analysis of sites along the Silk Roads that could be used by States Parties participating in the *Serial transnational World Heritage nominations of the Silk Roads* as a basis for comparative analyses when nominating series of sites. This may take two forms:

- Profile the distribution and distinctiveness of Silk Roads sites in order to understand how sites are manifestations of the shifting systems of power and patronage that prevailed over time along the Silk Roads, in relation to the organisation of flourishing trade and the protection of trade routes.
- Define the distribution of Silk Roads sites, in order to understand:
 - What sites are common to the whole extent of the Roads
 - What sites are specific to the whole Silk Roads or to certain parts of the Roads
 - What sites are unique or exceptional
 - Which sites are plentiful and how their form varies in time and space
 - What sites are persistent over time
 - What sites reflect specific period of history, power systems or cultural traditions.

6.1 Routes & corridors

As discussed (section 2.4) the scale of the routes across the vast area of the Silk Roads as defined in this study, has led to more than 75,000 km of routes being plotted. The scale of resolution on many of these is necessarily broad-brush (section 5.3), and undoubtedly these can and will be augmented in the future¹⁹.

In many cases there has been insufficient field research to convincingly argue the detailed chronology of specific segments or routes. We know that different routes rise to prominence at different times - for example, the shifting emphasis on the routes around the Taklamakan Desert²⁰ – but often without a great deal of precision about the fluctuations. The Tea Horse road is just one example of the complexity of route development and chronology (see panel below).

¹⁹ The corridors through Iraq and Syria, for example, need elaboration both in terms of character and delineation, as and when the State Parties are able to engage with the Silk Roads process. Currently the routes have been defined by reviewing existing literature (e.g. Dussaud 1927) or maps (e.g. a map of the Antiquities of Iraq, dated 1967, prepared by the Directorate General of Antiquities). These give a reasonable overview of the major settlements and monumental archaeology, but do not include way stations and smaller settlements/structures.

²⁰ Especially between the northern *Tianshan bei lu* route and the southern *Nan Shan Bei Lu* route (Baumer 2003; Baumer 2008; Wood 2002).

The Tea-Horse Road

The Tea-Horse Road (sometimes called Southern Silk Road), comprised a network of horse, mule and human caravan paths through the mountains from Yunnan Province in southwest China to South Asia. These are argued as having developed, at least in part, around tribute rather than trade goods, but the routes encompassed trade, migration and strategic military activity. “Salts, medicines, silver, pelts, jewels and all manner of other goods would in time find their way along the Tea Horse Road making it what some locals called a ‘conductor of economies’” (Fuchs 2008, 64).

The routes are often thought to have started in the early T’ang Dynasty (618-907 CE) and by the 10th century CE a complex networks of routes linked Yunnan to India, Nepal, Tibet and central China (via Sichuan Province) (Rapoport 2008). However, this should not mask the fact that routes between southwest China and South Asia had operated over considerable periods of time: in the 2nd century BCE Zhang Qian observed bamboo canes and cloth from southwest China in a market of Balkh (Afghanistan), and was informed that merchants had bought them from India, indicating trade routes from southwest China to India, and then on to Central Asia, were operating at that time (Gosch & Stearns 2008).

As a result, it is not useful, in the context of either this study or the nomination process, to try to substantially refine the chronology of each route at this time. Rather the nomination process is better focused on reflecting the main routes, over the agreed timescale (the 3rd century BCE to the 16th century CE), and thus attempting to reflect the scale and diversity of the routes and their internal chronologies. The routes into South Asia, including those across the Tibetan plateau (Tong 2013), should be a priority for inclusion, to reflect this complex pattern.

6.2 WHS and TL distribution

6.2.1 Existing WHS

A total of 35 major sites along the Silk Roads have already been successfully nominated as WHS (Table 2). All of these sites justified inscription in their own right, but many explicitly drew upon their relationship to the Silk Roads (e.g. Samarkand or Palmyra), or were very closely associated with the outcomes of the routes (e.g. Mogao Caves, Dunhuang).

Country	UNESCO Name	(i)	(ii)	(iii)	(iv)	(v)	(vi)
Afghanistan	Cultural Landscape and Archaeological Remains of the Bamiyan Valley	X	X	X	X		X
Afghanistan	The Minaret of Jam		X	X	X		
China	Historic Ensemble of the Potala Palace, Lhasa	X			X		X
China	Mogao Caves (Dunhuang)	X	X	X	X	X	X
China	Mount Qingcheng and the Dujiangyan Irrigation System		X		X		X
Iran	Bam and its Cultural Landscape		X	X	X	X	
Iran	Bistun		X	X			
Iran	Dome of Soltaniyeh		X	X	X		
Iran	Meidan Emam, Esfahan	X				X	X
Iran	Shushtar Historical Hydraulic System	X	X			X	

Iran	Tabriz Historic Bazaar Complex		X	X	X			
Iran	Takht-e Soleyma	X	X	X	X		X	
Iran	The Armenian monasteries of Iran		X	X			X	
Iraq	Hatra		X	X	X		X	
Iraq	Samarra Archaeological City		X	X	X			
Kazakhstan	Ahmed Jasawi architectural complex and archaeological site of the medieval town of Yasi-Turkestan			X	X	X	X	
Lebanon	Anjar			X	X			
Lebanon	Baalbeck	X			X			
Lebanon	Tyre			X			X	
Nepal	Kathmandu			X	X		X	
Pakistan	Buddhist Ruins of Takht-i-Bahi and Neighbouring City Remains at Sahr-i-Bahlol				X			
Pakistan	Historical Monuments at Makli, Thatta			X				
Pakistan	Taxila			X			X	
Syria	Ancient City of Aleppo			X	X			
Syria	Ancient City of Bosra	X		X			X	
Syria	Ancient City of Damascus	X	X	X	X		X	
Syria	Site of Palmyra	X	X		X			
Turkey	Great Mosque and Hospital of Divriği	X			X			
Turkmenistan	Archaeological Park of Ancient Merv		X	X				
Turkmenistan	Kunya Urgench		X	X				
Turkmenistan	Parthian Fortresses of Nisa		X	X				
Uzbekistan	Historic Centre of Bukhara		X		X		X	
Uzbekistan	Historic Centre of Shakhrisyab			X	X			
Uzbekistan	Khiva (Itchan Kala)			X	X	X		
Uzbekistan	Samarkand – Crossroads of Cultures	X	X		X			
		Totals	12	20	25	24	6	15

Table 2. Current World Heritage Sites within the study area, with some connection to the Silk Roads: showing criteria for inscription.

6.2.2 Tentative list sites

At present there are 221 relevant sites on Tentative Lists across the study area (Annex 2). These reflect a broad range of site types and landscapes, but with a strong emphasis on the ‘Outcomes’ of the Silk Roads (see below, section 6.3).

Geographically the sites are widely spread, although there are obvious clusters and gaps (Figure 11).

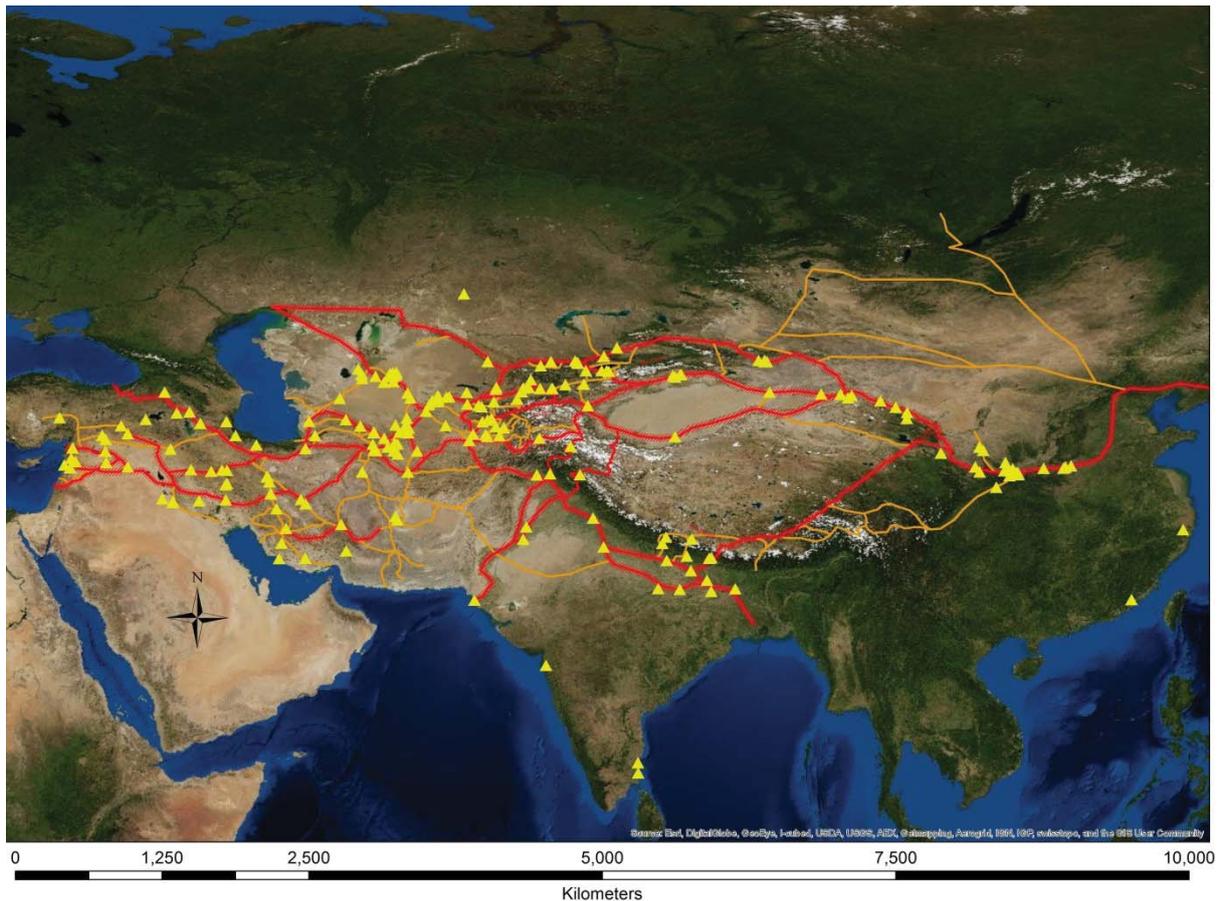


Figure 11. Distribution of current Tentative List sites (yellow triangles) across the study area.

6.3 Silk Roads site categories

6.3.1 Definitions

The Silk Roads concept paper (UNESCO 2008a) and the draft statement of OUV (UNESCO 2009a) (reproduced here in Annex 1) proposed that the types of monuments, sites and cultural landscapes found along the Silk Roads could be categorized under:

- **Category 1 Infrastructure** - facilitating trade and transportation (including caravanserais and inns; military posts, garrison stations and fortifications; bridges; irrigation systems; natural and cultural landmarks).
- **Category 2 Production** - of trading goods (including mining, metal working, manufacturing and handicrafts, and other industrial and production sites).
- **Category 3 Outcomes** - such as cities, art, knowledge as a result of contact and exchange (including trade cities, urban centres and settlements; religious, spiritual and ceremonial sites (including shrines, caves, tombs, sites of pilgrimage); and places of associations with political events, transfer of ideas, language, music, dance, poetry, etc.).

6.3.2 Number of sites and their distribution

Taking a very broad classification of the TL sites against the Silk Roads categories, 29 represent aspects of the infrastructure of the routes, 183 outcomes, and none production. Looking at the Silk Roads Thematic Study project database (see Annex 4.2), of 473 sites, 64

might be classified as infrastructure, while 409 are associated with the outcomes. Again, no sites are specifically associated with production (Table 1 & Table 3).

Type	OWTRAD	Ball	SR database	On TL	TL Country
Category 1 Infrastructure					
Bridge	1	11	3	2	IR, TM
Caravanserais/inns /etc	684	18	16	8	KZ, KY, IR, TK, TM, UZ
Dam			1	-	-
Fort			24	5	KY, TJ, TM
Bazaar			1	1	IR
Irrigation systems			1	2	CH
Outpost/station			3	1	CH
Pass/Path/Track	135		14	1	CH
Watermill			1		
Category 2 Production					
Category 3 Outcomes					
Bas-reliefs			4		
Petroglyphs			1		
Religious sites					
Monasteries	592				
Burial Mounds			6	4	KZ
Cemetery			3	1	CH
Grotto complex			18	15	CH, TM
Mausoleum			22	13	CH, KY, TM, UZ
Religious complex			65	15	CH, IN, TJ, TM, UZ
Caves		120			
Settlements	2,112	365			
Citadel			7	1	KZ
City			268	86	ALL
Others					
Köshk			1	-	-
Palace			5	-	-
Village			1		
Cultural Landscape			8	2	KY

Table 3. Numbers of sites within the study area, by broad type, from three different data sources: OWTRAD²¹ (perhaps the most extensive general Silk Road dataset, with detail on smaller halting places, settlements and monasteries), Ball's Afghanistan gazetteer (as an example of an intensive regional study), and the Silk Roads database compiled for this study (which focused on extracting major sites from all datasets/published sources).

²¹ OWTRAD nodes database identifies 2,971 places within the study area.

The distribution of these types of sites across the study area is considered below.

6.3.3 Category 1 Infrastructure

6.3.3.1 Caravanserai & way stations

The scale of way stations, caravanserai, khans, funduqs, etc.²², along the Silk Roads was enormous. OWTRAD has identified 684 significant stopping places supporting long-distance communication routes within the study area, including 529 caravanserais/khans, 5 funduqs, 7 hospices and 143 halting places (Figure 12).

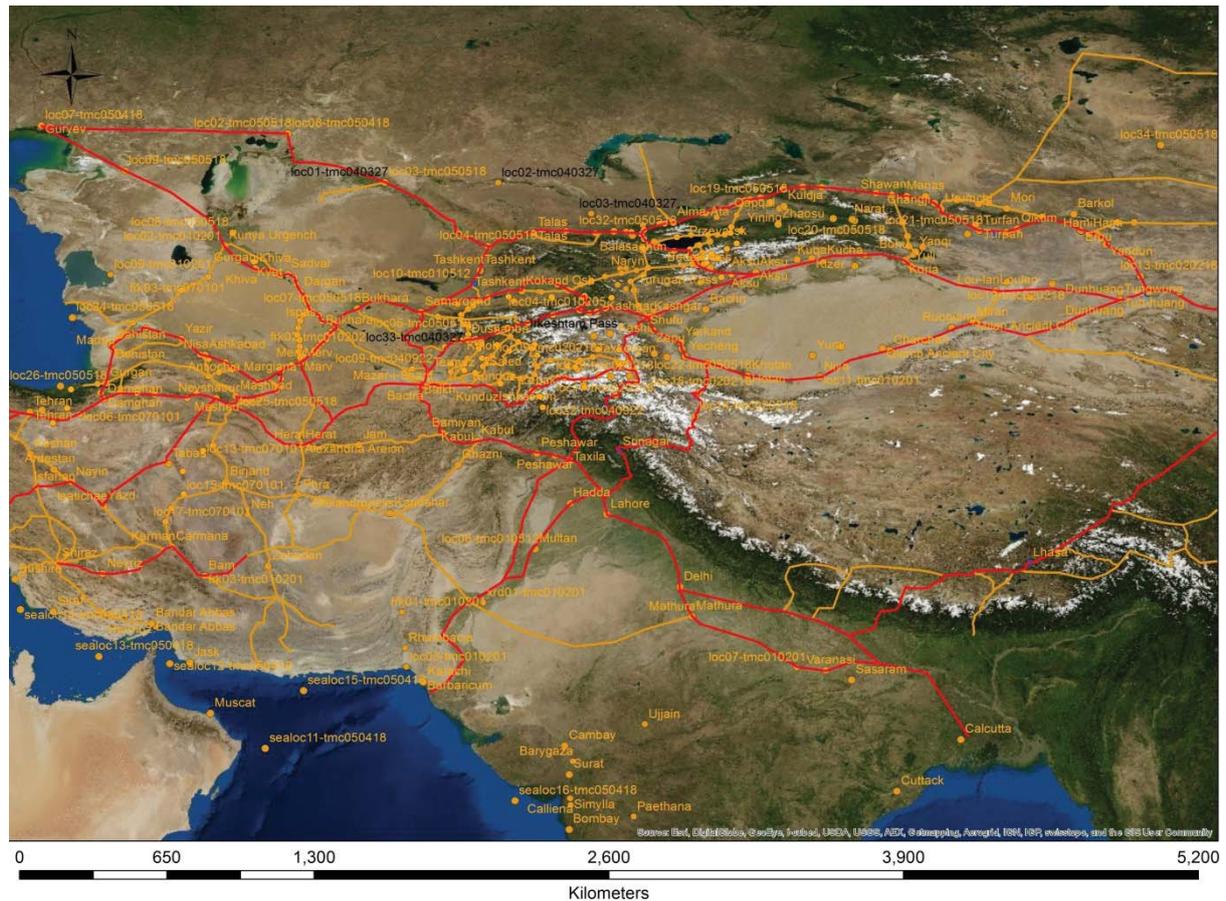


Figure 12. Stopping places as mapped from the OWTRAD data, showing something of the scale of the sites in the central area of the Silk Roads.

However, OWTRAD is very much a work in progress²³, and detailed local inventories show that the picture is likely to be even more complex: Siroux (1949), for example, identifies 259 caravanserais in Iran alone (compared to the 175 identified in OWTRAD). Recent research in Turkmenistan (Williams & Wordsworth 2010) suggests that there are at least 30-40% more stations than previously recognised. The OWTRAD coverage is patchy at present, with little work done on China, Kazakhstan, Kyrgyzstan, Nepal, etc. (see Table 4). So the density of sites currently known probably largely reflects where there has been intensive work

²² Variety of terms and forms: see terminology in <http://www.ciolek.com/OWTRAD/trade-routes-glossary.html>

²³ OWTRAD has a variety of data concerning way-points along routes: some substantial settlements, some way-stations (see, for example, the Bulianov_1999_Turkmen dataset). These are as yet unsorted and are not included in the above figures.

(Turkey, Syria, Iran, India, etc.), or the inaccessibility or lack of data on way-stations in other areas, and thus reflects research rather than original distributions or concentrations.

Country	Number of caravanserais & halting places listed in OWTRAD
Afghanistan	13
Bangladesh	10
China	3
Israel	9
India	162
Iraq	11
Iran	175
Jordan	3
Kyrgyzstan	3
Kazakhstan	3
Lebanon	15
Pakistan	8
Palestine	12
Syria	51
Tajikistan	6
Turkmenistan	7
Turkey	154
Uzbekistan	15

Table 4. Numbers of caravanserais and halting places listed in OWTRAD, by country.

Nevertheless, there were clearly some distinct local variations in the density and chronology of buildings (Constable 2003; Schutyser 2012; Silverstein 2007). For example, it has been suggested that “during the Middle Ages caravanserais were apparently not built along Syrian desert roads, apart from rare cases. Some stopovers were built only along the Damascus-Palmyra axes and, even in this case, hardly ever on the first stages of the road, the nearest to Damascus. ... Caravanserais concentrated along the Aleppo-Damascus road during both the Ayyubid and Mamluk period alike” (Tavernari 2009). (This distribution is reflected in Figure 13). However, the problem is that often only later, more substantial, way-stations have been identified and it is probable that there was a range of earlier structures along the routes through the Syrian deserts²⁴. To the east of Palmyra, however, there appears to be a dearth of way-stations on the routes to the Euphrates²⁵.

²⁴ Current survey work is being conducted by the University of Bergen, augmented the map of Syrian sites associated with trade around the Palmyra region, but this is still incomplete and the routes from Palmyra across the desert need to be defined further.

²⁵ Although there are a number of desert castles in the east, such as Qasr al-Hayr al-Sharqi (on Syria’s Tentative List – a very good example of this form of structure): these probably performed a variety of administrative, military and palatial functions.

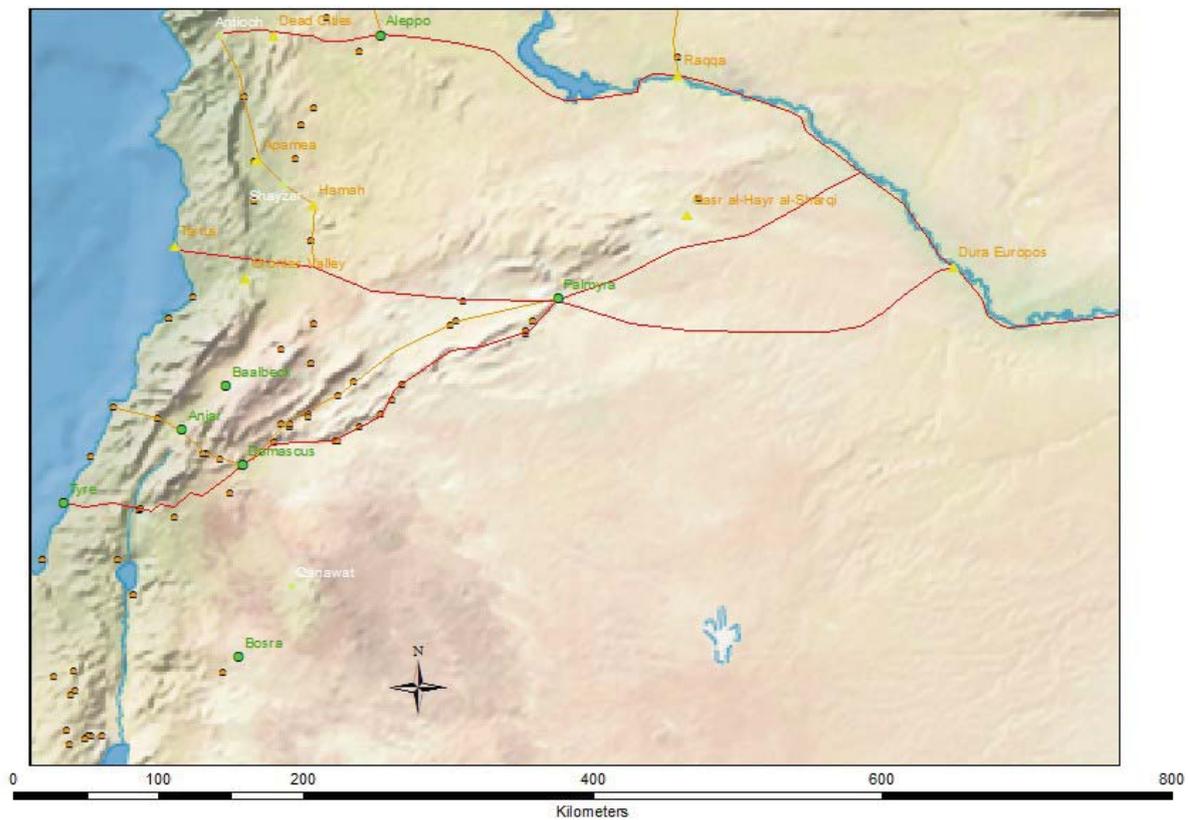


Figure 13. Distribution of caravanserai (orange circles: based on OWTRAD data) in Syria, with the concentration of known sites between Damascus and Palmyra, and the paucity of sites in the eastern Syrian desert.

Overall, however, some form of way-station seems to have been prevalent across most of the study area. Indeed, the functional need was almost inescapable. Way-stations enabled the exchange, distribution, and storage of goods, and the re-victualing of travellers with food, fodder and drinking water. The distance between way-stations, and the types of services they provided, was conditioned by a number of factors:

- Terrain (e.g. the differences between flat valley bottoms and steep mountain climbs²⁶).
- Aridity and the availability of fodder/grazing²⁷.
- The type of shelter required (e.g. inclement mountain terrain).
- Political context: the balance of private and state sponsorship, and issues of security, taxation and control.

²⁶ The mountain halts in the OWTRAD database show the complexity of the patterns and distribution: we are only just beginning to get a handle on this.

²⁷ The carrying capacity of any caravan was heavily conditioned by the availability of water supplies and fodder: "Where both fodder and water were plentiful so that only food needed to be carried, and where the provisions represented no more than 70% of the total load, one metric ton of merchandise could be transported by 133 porters walking some 270 km in nine days. Under the same conditions, a team of four drivers and 23 pack camels could move the same cargo across some 1060 km and do so in 38 days. However, where neither fodder nor water were available en route, and the weather was hot, the maximum operating ranges would shrink dramatically. Porters would walk only one day and cover a mere 23 km, while the camels and their handlers would walk only for five days and cover no more than 150 km. ... land routes were governed ruthlessly by the spacing of dependable sources of drinking water and the prevailing temperatures." (Ciolek 2006).

As a result, we see different types of networks develop - with different forms of architecture, and intervals between stations – changing over both times and space - reflecting these changing ideas and responses to control and local eco-climatic factors. However, while the posts around the Taklamakan, for example, are physically very different to the caravanserais of Central Asia and the Middle East, they probably performed many of the same functions – protection, refuelling, and the control of the flow of goods and taxes. The scale of shelter, the degree of transshipment and storage, the scale of the refuelling (food, water, fodder), all varied – but the basic need for such way-stations did not: they occur along the majority of the Silk Roads routes.

Where there is detailed evidence available, way-stations often seem to have lain about one-day's travel apart (Siroux 1949) - where there was a need for (and infrastructure to provide) these services, they existed. However, in other areas they were more widely spaced (more than a single day's journey), when it was possible to camp, where supplies of water and fodder could be gleaned from the landscape, and/or where security was good.

Two specific caravan routes are already on Tentative Lists: Seljuk Caravanserais on the route from Denizli to Doğubeyazıt (Turkey) and the Ghaznavid-Seljuk caravanserai in Khorasan (Iran). These cover the Anatolian landscape and the Iranian plateau; but additional *priorities for nomination* will certainly need to reflect not only the well-developed Near Eastern systems (the Syrian Damascus-Palmyra group is another well preserved example), but also needs to capture the desert routes in Central Asia and China, the piedmont and valley-systems through Central Asia and western China, the broadly east-west Sub-Continent routes of Afghanistan-Pakistan-India (& Bangladesh), the high mountain routes of India-Nepal-China, the complex system of way-stations in eastern China, and the responses in the Korean peninsula and Japan.

Isidorus of Charax, a geographer of the 1st century BCE/1st century CE, described various posts and routes, stretching from the Mediterranean coast and across the Persian plateau to the border with India, the distances between them specified, in a book entitled *Parthian Stations* (Isidore of Charax - trans 1914).

6.3.3.2 *Military posts, garrison stations and forts*

Similar to caravanserai, the control of routes, whether for protection or extraction/taxation, was a dominate feature of most sectors of the routes. In places these functions were inseparably from way-stations/caravanserais: for example in some of the high mountain passes. Elsewhere, specific military control points were established, for example with the forts and watchtowers of the Taklamakan region (both to north and south of the desert). These types of sites reflect specific regional political and social responses to the organisation and infrastructure of the routes, and as such are an important component of capturing the complexity and diversity of the Silk Roads.

At present the problem is that few of the smaller sites (watchtowers, small forts, military staging posts/postal stations, etc.) have been accurately mapped and published (at least in internationally accessible sources). State Parties are probably much more aware of the diversity and range of such sites within their territories, but these will be extremely important of the routes to capture within the selected corridors.

6.3.3.3 Bridges

Relatively few historic bridges have survived in anything like an authentic form along the Silk Roads. The main concentration of published material comes from Afghanistan (11 mentioned in Ball's gazetteer, including the monumental structure at Pol-i Malan), Iran (including a group of some 60 bridges in Lorestan, included on the TL under 'The Collection of Historical Bridges'), southern Turkmenistan (1 site, Pulkhatyn, on the TL; others known), Syria (good examples at Cyrrhus & Qanawat) and Lebanon. To some extent this reflects the geographic conditions of this region, from western Central Asia to the Mediterranean, with relatively deeply incised and un-fordable rivers requiring more permanent crossing points, combined with the availability of stone building materials. Across this region, where such structures survive, with an acceptable degree of authenticity²⁸, they should be a priority for inclusion in appropriate corridors.

It is likely that bridges were needed in other parts of the Silk Road: however, documentation is remarkably scarce. This may reflect different local adaptations; such as fordable rivers, crossing points significantly changing to reflect seasonal flood waters, or timber bridges which have not survived.

6.3.3.4 Irrigation systems

Irrigation was vital in many regions along the Silk Roads, in shaping the landscape and providing an agriculturally productive base to sustain significant population densities. The flourishing of urban centres, and the scale of craft specialisation and artistic outputs that they achieved, would not have been possible in many places without complex hydrological management.

Attention has been paid to some of the systems, particularly where they have left major structural legacies such as the qanāts and Karez systems (see below 6.3.3.4.2), but there has been insufficient research in many areas into the development of canals, dams and other water-management systems.

6.3.3.4.1 Rivers, canals and dams

Unsurprisingly there is a very wide variety of river and stream systems within the study area (see Figure 14; and also Table 1, as an example of the range of sources in the Central Asian region).

There are some very *major drainage systems*, such as the Tigris and Euphrates, the Indus, or the Wei He, which were major sources of irrigation and urban development from well before the rise of the Silk Roads. These river systems were often relatively easily exploited, with large alluvial and fertile lands, and these areas saw the rise of many of the major pre-Silk Roads civilizations. These areas were to become crucial staging points along the Silk Roads, with important social and cultural developments taking place through the stimuli of the Silk Roads, but it is clear that their hydraulic management, nor the resultant urbanisation, was not a unique feature of the development of the Silk Roads.

²⁸ Some have been substantially rebuilt in later times, given the continuity of some crossing points, and have little historical authenticity.

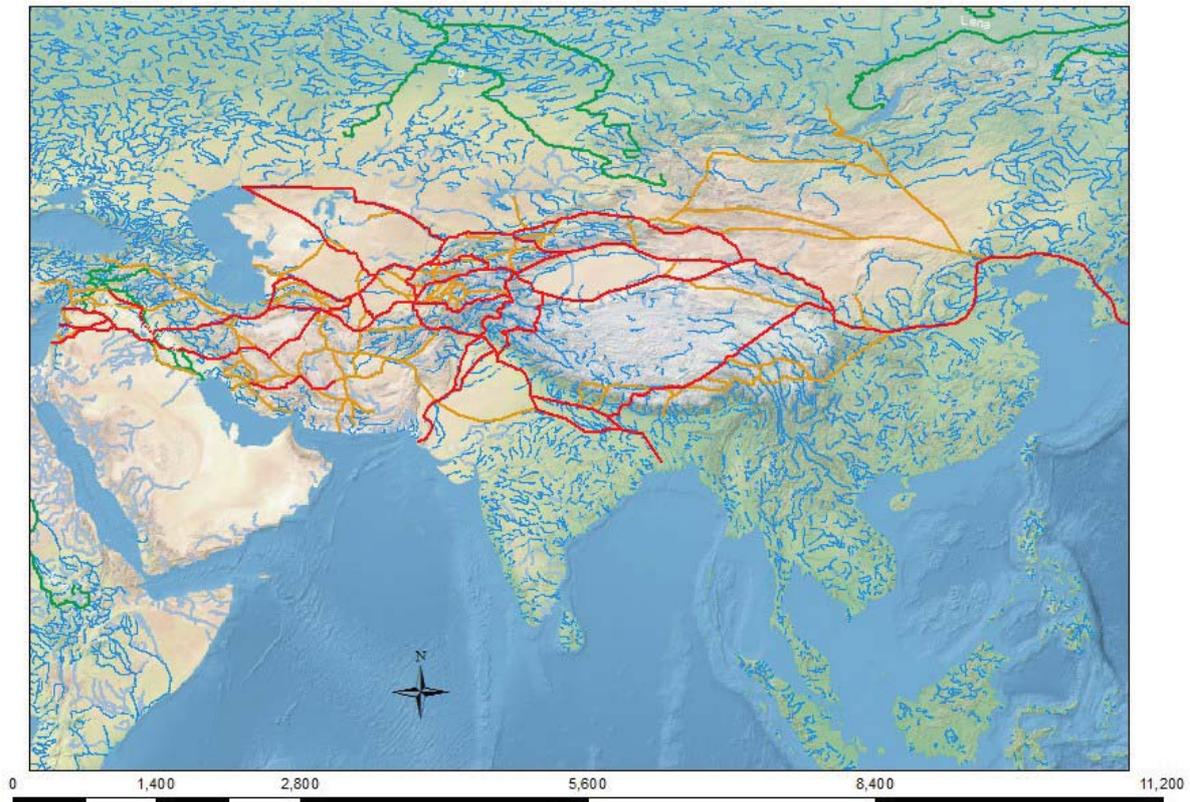


Figure 14. Major linear water systems (in blue) and some of the major drainage systems (in green, such as the Tigris/Euphrates and the Ob), against the Silk Roads (red and orange).

In contrast, a number of *major glacier or mountain rainfall-fed river systems* – for example the Murghab (Turkmenistan), Amu Darya (ancient Oxus) (Turkmenistan, Uzbekistan, Kazakhstan), Zarafshan (Uzbekistan), Syr Darya (Kazakhstan), and Yarkand and Ak-su rivers in Taklamakan - crossed the Silk Roads and the ability to manage and exploit these became an important facet of sustaining large-scale populations along the Silk Roads, supporting the development of intensive urbanisation along its routes. Many of these river systems are deeply incised and thus hard to use for irrigation along large stretches of their courses. As a result, they often required complex engineering in order to effectively exploit them. Crucially, although many were exploited much earlier on a smaller scale, or at their margins (like the Murghab), it could be argued that it is the development of complex hydraulic civilizations that enable these areas to sustain large-scale agricultural production and thus large populations and urban centres. This in turn was a crucial feature of the development of the Silk Roads, for without these centres of urbanism, both in terms of production and consumption, the volume of movement along the Silk Roads would have been considerably less, as would their overall impact.

In many cases dams were probably used to manage these many of the irrigation systems: normally located at the headwater of a delta or upstream of the land to be irrigated, and used to control the flow of water into channels and canals radiating from those points. But relatively little archaeological work has been done on these. For example, we are aware of systems at Soltan Band (Turkmenistan) to control the Murghab River and the canals/channels of the delta, but as yet we know little of their date or construction. In part, this is because these strategic points in the landscape are oft reused, and the traces of early

hydraulic systems has been destroyed or disappeared under, more modern adaptations. Recent work in the Zarafshan Valley in Uzbekistan (Stride et al. 2009) demonstrates that the construction of canal systems can be explored to good effect and the complexity of the hydraulic management reconstructed. Any good evidence for this form hydraulic management (possible candidates might include the Zarafshan and possibly the Chu valleys), where dams/canal management can be effectively documented and protected, would be a priority for State Party inclusion in the nomination process.

Area	Flow	Description	Approx. first irrigation	Researcher(s)
Piedmonts streams				
Kopet-Dag	Spring-fed, max. flow in spring, min. in January	Small and stable water discharges, easy to control	5000 BCE	Masson
Nuratau range	Spring-fed, max. flow in spring, min. in January		1200 BCE	Gulyamov
Karatau range	Spring-fed, max. flow in spring, min. in January			Gulyamov
Ferghana	Snow and ice fed, max. flow in July. Also numerous streams spring and rain fed.		1500 BCE	Bernshtam, Latynin
<i>In all the above, during the medieval period, ground-waters were exploited by creating artificial springs through underground systems of qanāts (karez) (Smagulov & Sala 2003)</i>				
Hissar (Surkan-Darya and Kafirnigan rivers)	Snow fed, max. flow in June, min. in January		800 BCE	Dyakonov
Ushrushana	Snow and ice fed, max.		600 BCE	Negmatov

	flow in July, min. in December			
Kaunchi-Karatau (Churchik and Arys, right tributaries of the Syrdarya)	Snow and ice fed, max. flow in July, min. in December		In Tashkent region 400 BCE Arys river area 100 BCE	Terenozhkin Podushkin
Lowland and delta streams/rivers				
Murghab and Tedjen deltas (Margiana)	Rain fed, max. flow in May, min. in August	Both deltas lose water in the desert floodplains. Most unstable water regimes of large rivers of Central Asia. The Tedjen, most irregular, carried 26 m ² /sec in 1925 and 1000 m ² /sec in 1956. Murghab delta where first large scale perennial reservoir irrigation systems	2200-2000 BCE	Masson, Gubaev, Tosi, Ceseratti
Dahistan (Atrek, Gorgan)	Rain fed, max. flow in May, min. in August	Similar to above - unstable water regimes	1200 BCE	Masson
Northern Bactria (Surkhandarya)	Snow fed, max. flow in June, min. in January		2000 BCE	Dyakonov, Kabanov, Sarianidi, and Askarov
Southern Bactria (Balkhab, Kunduz)	Snow fed, max. flow in June, min. in January		2000 BCE	Dyakonov, Kabanov, Sarianidi, and Askarov

Kashka-Darya delta (Hissar)	Snow fed, max. flow in June, min. in January	The delta loses its waters in the desert floodplain. The region is poorly studied and irrigation possibly started as early as in northern Bactria	?300 BCE	Dyakonov
Zerafshan river delta and middle course (Sogdiana)	Snow and ice fed, max. flow in August, min. in January	The delta distributaries, and is very irregular. Dies out 30 km before reaching the Amu-Darya	1800 BCE in the delta, 1200 BCE on the middle course	Latynin, Terenozhkin, Besenval, Tosi
Amu-darya (with Akcha-daria and Sarykamysh deltas)	Snow and ice fed, max. flow in July, min. in January	The Amu-Darya is one of the muddiest and transporting rivers; average water discharge of 2000 m ² /sec at the exit from mountains; 500 m ² /sec lost in evaporation; much lost today in irrigation practices	Akcha 1300 BCE, Sarykamysh 600 BCE	Tolstov, Andrianov, Ittina
Syrdarya (with Kuvan-daria and Zhana-daria deltas)	Snow and ice fed, max. flow in April and July, min. in December	Syrdarya forms an ill-defined floodplain; numerous meanders	700 BCE Middle course c 200 CE at Chardara/Otrar	Tolstov, Andrianov, Maksimova, Levina
Semirechie streams and deltas (Talas and Chu)	Snow and ice fed, max. flow in July, min. in December	Both rivers form deltas which lose waters in the alluvial-aeolian plains of the Moinkym desert.	200 CE	Senigova, Kozhemyanko

Table 5. Water systems in Central Asia: rivers, streams and deltas. (After Sala 2003, 4-5.)

6.3.3.4.2 Qanāts/Karez

One particular form of irrigation and water-supply system that has received some attention are the underground systems variously referred to as Qanāts, Karez and al-Falaj systems

(Figure 15). These were very effective in managing water resources, especially in hot climates where open systems are prone to massive evaporation loss. They are complex and require considerable labour to construct and to maintain.

There is extensive survival of these features across the study area. Obviously their distribution is in part dictated by specific topographic/climate circumstances: water sources, the need to protect against evaporation loss, etc. They are well known in Jordan, Syria, Iraq, Iran (e.g. Bam & Yazd), Afghanistan (e.g. Herat), Turkmenistan (e.g. Nisa), Pakistan, Central Asia (Smagulov & Sala 2003) and China (e.g. Turfan - Bertrand 2010). They are also present in areas outside the study area, such as Azerbaijan.

Once again, there are some problems with the scale of research that has been undertaken into these features. In many places there is inconclusive evidence for their original introduction and construction; which is often complicated by their longevity, with some antique examples still in use today (e.g. Herat in Afghanistan). Their use, in a developed form, is argued from c. 5th century BCE in Achaemenid Empire (Iran, Turkmenistan and Afghanistan), which may suggest that the technology spread from this region, although the dating elsewhere is not well researched. However, the spread and development of this form of water-management seems to have been a crucial factor in the development of the Silk Roads urban centres in many regions from the eastern Mediterranean to China. At present we know too little about subtle variations in the engineering and organisation of these systems, but this would be a useful facet of inter-State collaboration on nominations – any comparative analysis of these features, to support specific corridors, would be extremely useful.

In terms of priorities: Bam (Iran) has already been inscribed on the World Heritage List and includes an extensive qanāt system. Unfortunately Nisa (Turkmenistan) was inscribed on the list without including the extensive qanāt systems that dominates the surrounding landscape. It is not clear from the current Tentative List whether the Jiaohe site (China) encompasses any of the extensive Karez systems of the region. Given the importance of these features to the development of the Silk Roads, prioritised corridors should actively explore the ability to encompass evidence of these systems within their nominations.

This is also a potentially fruitful area of inter-State Party collaboration. These systems will have very specific documentation, management and interpretative needs. A new ICOMOS thematic study regarding *Water Management Heritage in desert and dry countries* will commence shortly and this may substantially develop the priorities in this area.



Figure 15. Qanāts crossing a now desertified landscape in Central Asia (Google Earth).

6.3.3.5 Mountain passes

There are a number of mountain passes that were an integral part of the infrastructure of the Silk Roads, enabling passage through key mountain ranges, especially in Central and Southern Asia. Many of these, these have also become iconic to the routes: such as the Iron Gates (between Termez and Sharisiyabz/Samarkand in Uzbekistan); Takhta-Karacha Pass (from Samarkand to Shakhrisiabz, Uzbekistan); Irkeshtam Pass (between Kyrgyzstan's Alay valley and China: shortest route between China and the Ferghana valley); the Hajigak, Unai, Shibar and Salang Passes (Afghanistan); Khyber Pass (connecting Afghanistan and Pakistan); Khunjerab Pass (between China and Pakistan through Kashmir: linked to the Karakorum Highway); Yangguan Pass (China: opened up by Emperor Wudi in the 2nd century BCE to access areas west of the Yellow River in Gansu: strategic point through which passed the caravans when travelling westward from Dunhuang to follow the southern route of the Silk Route into Central Asia); Sangju and Han'gu Passes (China). In some places evidence of the complexity of the physical landscapes survive without major modern interventions, particularly in the more remote mountain passes of the Pamirs, Tian Shan, and Himalayas.

Not only were these passes integral to the routes, but the control of these key strategic points attracted a number of empire systems and led to the establishment of a number of forts and watchtowers (c.f. 6.3.3.2). There is, unsurprisingly, considerable diversity in the nature of these controlling mechanisms, based upon empires and local adaption. There is some archaeological evidence that reflects the use of these strategic points: for example, the watchtowers at Yangguan (China), Baltit Fort (on the Karakoram Highway from Gilgit) (Pakistan), or the mountain forts and settlements of Ladak (India).

Priorities for nomination might be corridors that encompass good evidence of the physical landscape and adaption of the mountain passes. This would be particularly useful if this can

be combined with good evidence of local adaptations of control (forts, watchtowers, types of settlements).

6.3.3.6 Landmarks, markers & pillar stones

There are likely to have been many forms of markers along the Silk Roads, commemorating events, recording empires, providing guidance on routes, edicts of control or warning. But by their very nature, many were relatively ephemeral and there is a paucity in the archaeological record of what was probably once a common feature of the Silk Roads landscape.

Prominent landmarks, in the form of wayside shrines and religious sites, forts and watchtowers, way-stations and watering-points, would have made up an important part of the visual reference of the routes for many travellers. There are some notable examples of locating other forms of monuments to specifically impact upon the traveller, such as the bas-reliefs rock edicts at Shahbazarhi and Mansehra (Pakistan), which were clearly carefully located alongside the trade routes connecting the Vale of Peshawar with the valleys of Swat, Dir and Chitral to the north and the city of Taxila to the south east.

Perhaps the most amazing survival and regional adaptation are the pillar stones of Nepal and India. These provide both route markers but also reinforce the political patronage of the routes. Interspersed with small forts, these routes are a remarkable survival of the complexity of route infrastructure and control. These, and other regional manifestations of way-markers, would be extremely useful to capture in the nomination process.

6.3.4 Category 2 Production

As mentioned in the discussion of the current Tentative Lists (6.2.2), no sites were put forward solely on the basis of being production sites. In reality, most productive activities – crafts, textiles, dying, ceramics, metalworking, wood-working, etc. - were embedded within other forms of settlement; especially within, or on the periphery of, urban centres. As such these activities are being captured in the nomination process, but not as overtly as this categorisation perhaps intended.

To counter-balance this, it would perhaps be useful for nomination corridors to actively consider the nature of the productive elements in the settlements along the corridor: to emphasise, and provide supporting evidence for, specific productive elements that characterise the socio-political manifestation of the corridor – such as particular craft specialisations (types of pottery industry, metal-working, etc.).

Example: Merv (Turkmenistan) has good evidence of metal-working (copper-alloy, crucible steel, etc), glass, specific pottery types, etc., all of which can be demonstrated to have been significant impact upon the scale of regional, and in some cases long-distance, trade. These can be linked to documented and extant industrial zones surviving in the archaeological deposits of the site.

There are, of course, many productive activities of the Silk Roads that are not adequately captured by urban settlements. One obvious omission is agricultural production, not simply staple food stuffs, but the production of goods that travelled many hundreds or thousands

of kilometres: viticulture, sericulture (the very basis of the Silk Roads name), dried fruits (such as the famous dried melons), horses, cotton textiles, etc. (see section 6.3.5.3.2 below). Some of these may have been processed in settlements and can leave tangible remains (silk production vats, wine presses, tanning and dyeing vats, etc.), but the productive landscapes are very difficult to capture in the archaeological record.

Another obvious omission is the mining and extractive industries. The extraction of minerals, to support craft production on the Silk Roads, was an important element in developing specific industries and products. At present these sites/landscapes are poorly understood and certainly under-represented in both academic studies and heritage protection.

6.3.5 Category 3 Outcomes

6.3.5.1 Cities/towns

Cities are integral to capturing the complexity of the outcomes, infrastructure and often the modes of production of the Silk Roads.

The scale and complexity of cities along the Silk Roads is phenomenal. Within the currently defined geographic and chronological scope there are c 276 major cities and towns in the SR database, ranging from mega-cities like Antioch, Merv and Chang'an, to substantial regional centres. Some of the larger/best surviving cities are already nominated (Table 2), but these only represent a small sub-sample of the extraordinary range and scale of urbanism along the Silk Roads and filling the gaps will be complex. The forms of urban space varied considerably over both time and space.

Spatially, there are differences between the eastern Mediterranean, with its classical traditions, as opposed to the cities found in western and central Asia, created by the interplay between the spread of classical influences, initially during the Hellenistic expansion, with a complex mix of rectilinear street networks, classic public buildings and spaces, and densely packed urban housing, but also reflecting features of pre-existing Asian urbanism, such as large open areas in the corners of cities. The character of the cities also reflected local adaption to building materials, particularly the use of earthen architecture, and in many areas the lack of good building stone. They also reflect differing styles of architecture and religious buildings. All of this produced some significant crossovers and blends. Further east, we see very different forms of urbanism, including the growth of Chinese urbanism with a very clear demarcation and organisation of urban space from the Han dynasty onwards (Sit 2010; Wheatley 1971). There were also different attitudes to urban and suburban, the location of industrial production, the location of the elite in the urban space, etc.

The nature of the cities along the Silk Roads also changed over time, including the growth of discrete neighbourhood planning in the Islamic city (Bennison & Gascoigne 2007; Wheatley 2001; Whitcomb 2007), the increasing role of order, uniformity and rank in the Chinese city (Sit 2010; Wheatley 1971), or the changing location of palatial complexes in many forms of urbanism, away from the core to periphery of the urban area.

It will be difficult to break this up to try to capture the Hellenised/classical city; the Central Asia *qala*, the early Islamic city, the Imperial heavenly city, etc. However, that is exactly what a thematic approach will need to do: selecting corridors with a sufficient geographic spread, it will be possible to reflect the spread of the forms and expressions of urbanism along the Silk Roads, and their changes over time. This needs to capture all of the key elements/forms, and also the key chronological and social developments: so a selection of corridors across different geo-climatic areas, reflecting the varying chronological shifts in emphasis along the routes, will help to ensure that the wider range of responses are encompassed.

The complexity of the urban process along the Silk Roads - for example see the complexity of cities and settlements around the Taklamakan Desert/Tarim Basin (Di Cosmo 2000) - will also not be reflected by simply selecting major cities: these will tend to reflect well the elite structuring of political space, but will not necessarily reflect the full complexity of the adaptation of urban planning to local responses. There is also a need for the selected urban centres to reflect the manifestation of craft, industrial and artistic outputs, and again this will not always be best reflected in simply the largest urban centres: indeed, in many instances the larger centres are performing very different functions, and reflecting very different types of social and political elite display, to the smaller urban centres along the routes, and thus it is vital that the selection strategy reflects and encompasses these diversities. Again, the corridor approach should help to reflect the range of scales and attributes.

6.3.5.2 Religions

The spread of ideas and beliefs along the Silk Roads is a key feature of the significance and impact of these routes on world culture. The scale and diversity of ideological penetration into societies is complex to chart from the physical/tangible remains, but chronology, speed of movement, and the scale of institutions, can give some proxy indications of the range and depth of the impacts. The issue of elite patronage, which supported many of the more elaborate structures (and thus the ones most likely to be nominated), is also an important aspect to be reflected in both nomination and interpretation strategies.

It should also be noted that a range of smaller sites, sometimes with less substantial patronage, will also be captured within the urban landscapes and sequences (see section 6.6).

6.3.5.2.1 Buddhism

The spread of Buddhism from South Asia along the Silk Roads is well known, following the movement of monks, merchants, and other travellers. Literary, epigraphic, and archaeological sources reveal the growth of Buddhist monasteries from c the 5th century BCE to the end of the first millennium CE. Dynamic mobility was closely linked to trans-regional trade networks, extending from South Asia through the upper Indus into the Central Asian Silk Roads and through the high passes and the Tibetan plateau, to Tarim Basin and beyond (see Neelis 2011).

There is good surviving evidence of this aspect of the Silk Roads, both in terms of specific monuments (from the westernmost Buddhist stupa at Merv in Turkmenistan to the impressive monastic complexes in Japan) and artistic outcomes (such as the extensive and

complex wall paintings within the grottoes, shrines and monasteries of the Silk Roads). There is also good evidence for the complex development of the religion, with different branches of traditions and philosophies, reflected both in the artwork and the monastic monuments (see OWTRAD monasteries - Figure 16 - see Annex 4.3.4.3). There are also important interactions with other religions in the first millennium CE: for example, leading to the Hindu-Buddhist interactions at monasteries such as Krakravihar in western Nepal.



Figure 16. A sample of the Buddhist monasteries from the OWTRAD data sets, displayed in Google Earth. See Annex 4.3.4.3 for details.

6.3.5.2.2 Islam

The spread of Islam was initially a very different process to that of Buddhism, with the conquest of large portions of western and central Asia taking place during the rapid expansion of the 7th century CE. After that early diffusion, however, came a longer period of acculturation and interaction, with Islamic beliefs spreading through contact and travel, and with communities developing throughout the area of the Silk Roads.

The development of Islamic beliefs is well represented in the art and architecture of the existing Tentative Lists and other sites of the region. These tend to focus upon the later developments of the architecture, such as the Timurid mosques and mausolea of Central Asia, because of their outstanding survival. Early Islamic sites are much less well known, although they are represented in the archaeology of many of the settlement sites and would be well reflected if a range of major and minor cities, with good below-ground archaeological survival, are included in the list (see section 6.6).

6.3.5.2.3 Other religions & beliefs

Many other religions and beliefs, such as Judaism, Manichaeism, Nestorian Christianity, Shintoism and Zoroastrianism also spread along the Silk Roads and had extensive impacts upon the development of the societies along its routes. Surviving evidence for many of these is less obvious in the existing range of archaeological sites identified in the Tentative Lists. As with the early Islamic sites, there will be an extensive range of evidence surviving in the archaeological record and the inclusion of a range of major and minor cities along the length of the Silk Roads will help to capture the diversity of these impacts.

6.3.5.3 The movement of ideas

6.3.5.3.1 Technologies and inventions

The Silk Roads were also the routes along which new technologies and inventions could travel. From the east came, printing, gunpowder, cast iron, the crossbow, the magnetic compass, whilst from the west came engineering developments (such as bridge-building), tapestry weaving, calendrical sciences, vine cultivation, as well as certain glazing and metal working techniques. The transmission of glass manufacture from west to east (Fuxi et al. 2009; Razi 2010); the cobalt that the Chinese eventually used to produce blue and white Ming ware originated in Persia; one of the most studied transferred art motif, the pearl-edged medallion or roundel, began in Sassanid Persia and moved eastward, going all the way to Japan. And there was also a substantial exchange of medical knowledge and medicines.

“The Roman craftsmen who incorporated Persian textile and stucco ornament into the mosaics of Justinian I's Hagia Sophia, the weavers of Sogdian textiles who used Persian and Roman motifs, as well as Chinese ceramicists who adapted Persian shapes and motifs all provide ready examples of this phenomenon” (Canepa 2008, 139).

6.3.5.3.2 The spread of agricultural practices

A major impact of the Silk Roads was the movement of agricultural practices, and the spread of varieties and species of plants and animals. For example, the cultivation and working of silk itself (Frederico 1997), cotton (Riello 2013) and vines (see panel to right).

Archaeologically these processes can be studied, through botanical and faunal remains from well stratified and dated archaeological sequences. There has been considerable research into this field (e.g. Aubaile 2012; d'Alpoim Guedes et al. 2013; Zhang et al. 2013), which is now being supplemented by research into genetics into the movement and origins of both plant and animal species. For example, animal exchange networks are known to have played “an important role in determining gene flow among domestic animal

Soon after the return of Zhang Qian, Sima Qian states that grapes and alfalfa from the Ferghana valley were introduced into China: “The people [of Ferghana] love their wine and the horses love their alfalfa. The Han envoys brought back grape and alfalfa seeds to China and the emperor for the first time tried growing these plants in areas of rich soil. Later, when the Han acquired large numbers of the 'heavenly horses' and the envoys from foreign states began to arrive with their retinues, the lands on all sides of the emperor's summer palaces and pleasure towers were planted with grapes and alfalfa as far as the eye could see” Sima Qian, *Han Dynasty*, II, 245.

populations. The Silk Road is one of the oldest continuous exchange networks in human history ... facilitating animal exchange across large geographical distances and topographically challenging landscapes ... Horses are known to have been traded along the Silk Roads; however, extensive movement of horses in connection with other human activities may have obscured the genetic signature of the Silk Roads” (Warmuth et al. 2013, 5340). The potential for future work in this area is strong: see, for example, the doctoral research currently underway on the movement of rose species along the Silk Roads²⁹.

In terms of reflecting them in the Tentative Lists and nomination process, this is more difficult. Once again, protecting and conserving major sequences of urban deposits, from both major and minor settlements, will be important here and the corridor/node approach outlined in section 5 will assist with this.

6.3.5.3.3 Artistic & architectural

A significant impact of the movement of peoples and ideas along the Silk Roads was the transfer of architectural and artistic styles, often resulting in complex adaptations and reworkings. Under the Kushans, for example, Gandharan and Mathuran sculptural styles, and early Buddhist stone-carving practices, spread throughout Asia. This gave rise to the distinctive development of Buddhist art and architecture, but there were also significant amalgamations with local styles.

The interplay of architectural styles is also evident in the Islamic empires, where architectural forms incorporated many design elements for neighbouring areas, such as Hindu stone-working, Hindu naturalistic plant motifs, Chinese linear patterning and Byzantine domes and mosaic decoration; while influencing those areas as well, for example the spread of the pointed arch and arabesque decoration.

6.3.5.3.4 The movement of peoples

Empire systems (see below) provide only one framework for viewing the significance of archaeological evidence. Ethnicity and the movement of peoples provide another important selection criterion. The various merchant diaspora, such as the Sogdians, form a vital element of the Silk Roads. While the Sogdians never established a territorial empire outside their homeland (in the oases and river systems of modern-day Uzbekistan and the Tajikistan) their influence, from the 3rd to 8th centuries, came from the extensive colonies and trading enclaves they established in the regions to the east and south, from China and to northern Pakistan (de la Vaissière 2003; de la Vaissière 2005; Grenet 2003; Skaff 2003).

6.3.6 Conclusions: Silk Roads Categories

It seems evident that while Categories 1 and 3 are robust, with strong and diverse archaeological and architectural evidence along the Silk Roads, Category 2 does not hold up as well. There are virtually no specifically identified Category 2 sites, and there are no examples on any of the current Tentative Lists. The counterpoint, however, is that many of the Silk Roads cities contained major production areas, and this especially applies to smaller regional centres which provided the basis for craft production (e.g. Talgar in Kazakhstan, Park & Voyakin 2009). This makes it vital that the nomination strategy, including the

²⁹ Robert Mattock’s research: see <http://www.plantresearch-bath.org/tropical-biotech/robert-mattock/> [accessed 1 November 2013]

selection of corridors and the sites/landscapes within corridors, captures the complex aspects of the Silk Roads economy and production.

Category 3, when examined in detail, is dominated by cities and religious monuments. Places of association with political events, the transfer of ideas, language, music, dance, poetry, etc., are generally poorly represented at present. However, the movement of ideas is reasonably well represented: in art (e.g. wall paintings) & architectural innovations (e.g. dome designs), with some evidence for specific industrial technologies (e.g. glass and glaze manufacture), the construction of observatories (e.g. astronomical knowledge), etc. The frescoes at Kizil, for example, showing flying musicians playing flutes and four-stringed lutes, points to some of the intangible aspects of the social exchanges that took place along the routes. Generally, however, specific attention needs to be paid in the site/landscape selection, and in the articulation of OUV, to the transfer of ideas (beyond religions) and spread of technologies.

6.4 Empire systems

The changing dynamics of empires that spanned the Silk Roads is hugely complex. Major empires - such as the Han, Tang, Kushan, Mauryan, Sassanid, Roman, Parthian, Abbasid, Seljuk, to name but a few - held sway over considerable territories for protracted periods of time. The importance of these systems, and their interaction, are fundamental attributes of the Silk Roads. Empire systems not only shaped the development of settlements and societies within their boundaries, but also the interaction and exchanges between empires was vital in shaping identities: for example, the “processes of cross-cultural interaction between the courts of Rome, Sassanian Iran, and Sui-Tang China were primarily concerned with the formation and maintenance of imperial identity” (Canepa 2008, 144).

There were also numerous smaller polities, which controlled significant areas for varying lengths of time, such as the Kasa Malla in Nepal, the Himalayan kingdom of Ladakh, Kangars tribal confederation in Central Asia, the Nabataean kingdom in Jordan, or the Buddhist kingdom of Khotan. And beyond this, in many places and times smaller city states held local control, existing within, or often between, the dynamics of larger empire systems.

Not only did empire boundaries change over time, expanding and contracting in struggles for control of neighbouring polities, but also they were often more fluid than the simple boundaries that are often drawn on maps³⁰. Sometimes borders were marked by hard boundaries, such as forts, walls, boarder posts, etc.: one can hardly fail to acknowledge the Great Wall as a tangible demarcation of imperial space, but even here the influence of the empire systems was not always contained by these physical markers (Gaubatz 1996). Often boarder zones were complex areas of negotiated power, without hard edges, reflecting sometimes rapidly changing spheres of influence (e.g. Daryaee 2005; Nokandeh et al. 2012). The tensions at the boundaries/interfaces of polities also sometimes led to architectural innovations.

³⁰ The concept of ‘fuzzy edges’ might also be useful here, as the sharp lines on conventional maps seldom reflect the changing temporal boundaries, or the complex nature of some empire systems.

Empires, with their specific needs for administrative, political and military centres, and the role of borders (including the concepts of liminality and ‘edge of empire’), has had a profound impact upon the nature and development the urban nodes along the Silk Roads. In addition, regional conflicts and changing markets mean that the Silk Roads were never static. For example, we know of attempts by Rome to find routes that avoided Parthian control, because of the steep duties imposed by them on overland trade (McLaughlin 2009, 97ff).

These variations, over space and time, needs to reflected in the selection of corridors so that they encompass the both the major empire systems, and the borders/tensions between them. This will also impacts upon the selection of sites/landscapes within corridors to ensure that these reflect the diversity of settlement outcomes.

6.5 Nomads

The nomadic communities of Asia are a dynamic part of the interactions and productive systems of the Silk Roads. The tensions between nomadic and sedentary communities are often emphasised: usually characterised as the shift from subsistence to surplus farming, with changing land use leading to the displacement of nomadic peoples. Agricultural development, sedentarisation and urbanisation are seen as interlocking elements of this process. However, recent research has tended to suggest a more complex set of interactions, with nomadic and sedentary communities involved in the exploitation of different resources, and with exchange systems existing between them (Juliano & Lerner 2003; Baipakov 1990; Barfield 1989; Stride et al. 2009). Indeed, Xuanzang observed at Samarkand that nomads from the steppes further north brought their fur, cattle, and hides to trade (Wriggins 2004, 38) – feeding into the wider Silk Roads network.

6.6 Buried archaeological sites

The case for including sites on the World Heritage List on the basis of buried archaeological remains alone, with few visible surface signs, is always complex. There are often problems in understanding and demonstrating the scale of survival and attributes (values) of buried sites. Kashgar, for example, is one of the preeminent cities of the Silk Roads, a fulcrum through which much of the east-west traffic passed: but the problem is our lack of understanding regarding the scale of its buried archaeological resource and whether sufficient remains survive to constitute a viable nomination.

However, the inclusion of buried sites is fundamental to representing the diversity of the Silk Roads. In terms of geographic spread and local adaptation, a wide range of sites are needed to reflect many aspects of the Silk Roads. In particularly, such sites provide the opportunity to include sites that reflect:

- ***The spread of ideologies and religions.*** For example, the initial spread of Islam (section 6.3.5.2.2) is poorly represented in the standing monuments of the Silk Roads, but the buried remains of cities of the Silk Roads contain an unrivalled testimony to the development of this religion. The Friday Mosque at the centre of the city of Gyaur Kala at Merv (Turkmenistan), perhaps the first congregational mosque constructed in Central Asia, is already on the World Heritage List by virtue of

the inclusion of the whole city – but demonstrates the potential to reflect the spread of religions through their impact on urban settlements, and through specific architectures.

- ***Production (Category 2) and the transfer of technologies (part of Category 3).*** Buried urban settlements that contain complex evidence of crafts, industries, and production. These can both bear witness to the importance of these processes to regional and inter-regional trade and exchange, and also to the transfer of technologies along the Silk Roads.

7 The way forward

7.1 A single property?

The first *Coordinating Committee of the Serial Transboundary World Heritage Nomination of the Silk Roads* meeting raised the question: “Should we nominate sections of the overall cultural routes that reflect the necessary overall attributes” (UNESCO 2009b)?

The main purposes of this **Thematic Study** was to consider whether certain sections of the Silk Roads, through the assembly of sites within them, were distinctive from other sections of the Silk Roads, in terms of being manifestations of particular geo-cultural systems, and thus whether a case could be made for **nominating** Silk Roads sites as a collection of World Heritage serial properties, linked by a concept, instead of one single serial World Heritage property.

In order to address these questions, the Thematic Study has conducted a rapid review of the Silk Roads, using evidence that is available in an accessible published form, and compared this to basic cartographic, topographic, hydrographic and ecological data.

What this data has shown is that there are specific geographic aspects to the distribution of some site types along the Silk Roads (see section 6.3), reflecting very specific responses to their geo-topographic setting (e.g. grotto sites), or the extent of different empire systems or beliefs (e.g. the distribution of Buddhist stupa). Most site types – such as cities (6.3.5.1), way-stations (6.3.3.1), or religious complexes (6.3.5.2) – existed over the whole vast area of the Silk Roads, but they do differ considerably in terms of their specific form: reflecting local building materials, architectural styles, responses to climatic conditions, ideas about the organisation of urban space, the scale of centralised administration, and different political, ideological and cultural regimes.

This Thematic Study has attempted to identify different corridors along the Silk Roads where different responses, driven by both geo-climatic and socio-political forces, have resulted in different manifestations of infrastructure, production and outcomes (categories 1-3). It suggests (see below) that a number of the corridors could perhaps form the basis for separate Silk Roads serial nominations, reflecting the cultural diversity of the overall Silk Roads, whilst enabling the smaller sites of the Silk Roads to be captured within a nomination strategy (section 7.2.3).

In practical terms, some way of compartmentalising the Silk Roads into a number of World Heritage properties, linked by an overall concept, could be seen as highly desirable. It would produce more manageable serial nominations and would enable these to progress at differing paces, within an overall framework, and still maintain the concept of trans-national cooperation that lies at the core of this endeavour.

7.2 Nomination strategy

7.2.1 Introduction

It is important to establish a viable way forward with the project which will create an environment in which State Parties can both participate in trans-boundary activities and also

achieve clarity regarding site selection, and thus focus upon the next stages of this nomination process.

When the World Heritage Committee considers the first Silk Roads nominations, it will need to understand the overall nomination strategy, so that it may understand how individual nominations fit into the larger picture.

A nomination strategy should therefore enable a clear overview of the selection of sites and landscapes within the Silk Roads, and the scale of that selection, so that a cohesive ***Silk Roads framework*** can be presented to the World Heritage Committee. This would then enable separate serial nominations to be developed, each developing along their own timetables, and involving different combinations of State Parties, with the Committee understanding the relationship between them.

This study considers three options for selecting sites (section 7.2.2) related to themes, sites and corridors, and concludes that a selection of corridors would provide the most effective way forward. These corridors could be selected so that each manifests OUV through a selection of sites that reflect the specific manifestations of the Silk Roads in that particular corridor.

Assuming that this is a viable way forward, the study has then considered the criteria for selecting these corridors and offers a provisional list (section 7.2.3). The selection of specific sites and landscapes within each corridor is then discussed (section 7.2.4).

Issues regarding the compilation of nomination dossiers (section 7.2.5) and the harmonizing of Tentative Lists (section 7.2.6) are then reviewed.

To support this process, it is suggested that there is also a need for:

- Further research (section 7.3.1).
- Documentation and national inventories (section 7.3.2).
- A variety of capacity building exercises to support this process (section 7.3.3).
- Developing the role of expert groups (section 7.3.4).
- Data sharing and accessibility (section 7.3.5).
- Funding and support (section 7.3.6).

7.2.2 Themes, individual sites or corridors?

The scale of the Silk Roads, a vast landscape covering thousands of square kilometres, is such that it is impossible either to nominate all the surviving sites along the roads or all the corridors.

Three possible approaches to selecting a smaller number of sites/landscapes for possible nomination were considered:

- using a thematic approach to reflect the main attributes of the potential OUV of the overall Silk roads;
- selecting individual sites/landscapes against the overall Silk Roads' potential OUV;

-
- or selecting a number of spatial corridors along the routes that reflect the diversity of geo-political responses and outcomes, each of which could be considered as serial nominations with their own OUV.

The following summarised the arguments for each of those possibilities and explains why the corridor approach was considered the best way forward.

Themes: taking different attributes of the Silk Roads, and selecting the best sites and landscapes to represent the potential OUV of that aspect. For example, exploring the ‘Infrastructure’ of the Silk Roads through a selection of sites that reflected way-stations, irrigation systems, etc. Or exploring the ‘Outcomes’ of the Silk Roads by selecting sites that reflected the great cities of the Silk Roads; the Buddhist grottoes of the Silk Roads; the Islamic shrines of the Silk Roads; the music of the Silk Roads; etc. A range of such sites, perhaps c 20-30 in all, would be needed to fully reflect the range of attributes. Such a selection of sites would have the advantage of promoting trans-boundary working and the exchange of specific expertise (for example, in approaches to the management and conservation of Buddhist grottoes).

The obvious difficulties with this approach are that:

- It breaks up the understanding of the overall Silk Roads landscape: the interconnectivity of the large cities, the smaller market towns, the way-stations, the shrines and monasteries, etc. A collection of way-stations from along the route, divorced from their landscapes, their contexts of smaller towns, hydraulic management, natural passes, etc. seems less important.
- It will tend to omit the smaller categories of sites, going against the idea that the whole is greater than the sum of the individual parts.
- Some of the themes – the great cities for example – span the entire route and a single nomination of these sites would be a very complex process involving many State Parties.
- The selection of the most appropriate sites for each theme would require a much more detailed comparative analysis, justifying the selection. This Thematic Study offers some evidence to begin that process, for example highlighting the diversity of city forms along the Silk Roads (section 6.3.5.1), but these would need to be developed in greater depth for each thematic area. This would be very time-consuming and complex.
- Perhaps most importantly, the World Heritage Committee might not look favourably on this approach as the Ittingen meeting (Martin & Gendre 2010) noted the need for component parts of cultural properties to reflect clearly defined cultural, social, historical or functional links over time and not to be a mere catalogue of sites without an adequate definition of the functional links between the component parts³¹.

³¹ An amendment to paragraph 137 of the Operational Guidelines has been proposed to cover this.

Individual sites within a serial nomination: selecting individual sites within countries to reflect the potential OUV of the overall Silk Roads (effectively the existing strategy in the compilation of the Silk Roads Tentative Lists).

The obvious difficulties with this approach are that:

- The Silk Roads as one serial nomination is of enormous scope and extent and presents manifold management issues.
- It is hard to find cohesion in the site selection – the comparative analysis of the Silk Roads presented in this study helps to argue for specific selections within themes (above), but it is difficult to select, for example, one caravanserai here and another there and make a compelling comparative analysis for their inclusion. Should there be 5, 10, 20 or 100 along the route? How do they reflect political and social variations, as well as responses to different hydrological and topographic needs? Themes or corridors give a focus to such decision-making.
- Effectively thematic studies would be needed for each type of site/landscape, as above: these would need to be undertaken to justify why any given city, caravanserai, mosque, etc. had been selected.
- As a result, the nomination procedures would be very complex: it would effectively require agreement on all facets of selection before there was a clear picture of the overall nomination strategy and before any State Party would be able to proceed to a nomination.
- This complexity and difficulty has already been understood and demonstrated by the States Parties and this is why this Thematic Study has been undertaken.

Corridors: Selecting a number of corridors that reflect the Silk Roads’ diversity of geo-political contexts, and each of which could demonstrate OUV, might provide an approach that encompasses serial nominations of manageable scale. It could also reduce the scope of comparative analyses, and should also enable the fairly rapid selection of sites.

The overall shape of such a nomination strategy could be laid out now (see section 7.2.3) and, once agreed by the State Parties, it would be possible to progress different corridors on different timescales. Most of these would have the advantage of promoting trans-boundary working and the exchange of specific expertise.

Corridors focus attention both upon the major nodes of any particular segment, which will include some of the most important cities with all their complex evidence, and upon a range of smaller sites that capture the concept of movement through the landscape, its support and infrastructure, and the outcomes of religious, artistic and social change. It also supports the concept of the wider picture – that the whole is more than the parts – by capturing the smaller scale elements of the Silk Roads.

One of the difficulties with this approach is that:

- As with any selection process, some sites/landscapes may be excluded, due to insufficient sites having been identified. Also because of the inherent geographic focus of corridors, it is inevitable that some very significant sites may fall within segments not selected. In the two approaches above (themes and individual sites)

there is a meritocracy in the selection of sites, the most important sites can be included: in the corridor approach, a major site lying in a corridor not included in the prioritised list is potentially excluded from the nomination process.

However this approach need not preclude individual sites being nominated where they individually can be seen to manifest an exceptional response to the Silk Roads.

7.2.3 Selecting specific corridors

The corridors are attempting to provide an intellectual framework to discuss the selection of a series of sites along the Silk Roads, based upon their chronological, geo-climatic, topographic and societal factors. It is important to recognise that:

- i) Just because thousands of kilometres of corridors have been identified (Figure 3) it does not mean that all of these will be nominated. Indeed, it is envisaged that only a subset of the geospatial coverage of the Silk Roads will ever be nominated. The selection of which these are to be is the role of the State Parties and the Silk Roads Co-ordinating Committee.
- ii) It is possible to combine more than one corridor to form a single trans-boundary serial nomination. The start and finish points of the corridors as defined here are major nodal points (normally cities), but for the purpose of specific trans-boundary project, the start and end point of any nomination project can incorporate more than one corridor as defined below. The selection of start and end points for nominations has to be the role of the State Parties and the Silk Roads Co-ordinating Committee.
- iii) Similarly, a nomination project can also decide to only take forward part of corridor.

This Study has identified some of the corridors that might be taken forward as serial nominations (Annex 3 **Error! Reference source not found.**), but this is not a definitive list. The selection of corridors in this list tried to reflect the Silk Roads' variations in (1) the topographic, climatic and ecological landscapes, and also (2) its historical cultural diversity.

Selecting **(1) corridors that reflect the cultural responses to topographic, climatic and ecological variations** of the Silk Roads are perhaps easiest: we are looking at observable characteristics of contemporary landscapes and ecologies, with some extrapolation to historic conditions (e.g. the processes of desertification). We will need to include corridors that run through high plateau and mountain passes, fertile valleys and oasis, deserts and their margins, coastal littorals, major river crossings, etc.

Capturing the **(2) the empires and geo-politics** of the Silk Roads is harder. This is partly because we do not understand the full quality of archaeological sequences at many of the sites, or their dating. It is not always obvious from surface remains, for example, what the foundation date of the settlement was. For example, in Central Asia we have numerous sites with surface remains of late 12/13th century CE (the Mongol conquest), but whether deep beneath lie good examples of Kushan urbanism is more difficult to conclusively answer. Nevertheless, we do actually understand much of the scale, distribution and chronology of such empire systems (see section 6.3.5.2), and thus it is possible to argue that we can capture attributes of these by ensuring that buried sites, with good survival, are included (see section 6.6). We need to try to capture the major empire systems that flourished and

competed over the Silk Roads, as well as the development of the smaller kingdoms and city-states that interspersed them.

Nevertheless, we can suggest routes that capture the diversity of the responses to the geo-political organisation and the wider manifestations of the Silk Roads. A suggested list of corridors for the nomination strategy is given in Annex 3.

7.2.4 Site selection within chosen corridors

The concept is that the chosen corridors will each be able to manifest their own OUV as a significant and distinctive serial nomination within the overall Silk Roads framework. Sites selected within the corridors will be those that reflect, in a direct and tangible way, the specific character of the corridors as a geo-cultural ensemble. These would include sites that can be seen to manifest (see Annex 1):

- Responses to topographical and natural features
- Urban patterns and architectural designs
- Socio-economic development
- Political events that shaped the corridor
- Religious and spiritual activities
- Achievements in science and technology
- Specific achievements in the arts (sculpture, painting, carving, etc.)

It is not suggested that all sites within any given corridor could be selected for World Heritage nomination. Most of the corridors still represent very large landscapes (600-1,400 km in length) and the issue of scale is still problematic. It would not be realistic to include every way-station, watch tower, fort, small town, grottoes, monastery and major city along each corridor: it would not be feasible to document, protect, manage and conserve all the sites along such corridors, let alone ensure effective access and interpretation. Rather, sites would be selected on the basis that they make an outstanding contribution to the attributes of the OUV of a particular corridor.

For those corridors selected the 'generic' 60km buffer (section 5.2.3) should be replaced with a more nuanced boundary, reflecting the local topographic conditions (section 5.2.4). This would enable sites that fall close to, but currently outside corridors, to be included. It could also reflect more complex responses to regional conditions: for example the broader adaptation to wide fertile river systems such as the Ganges (Figure 17).

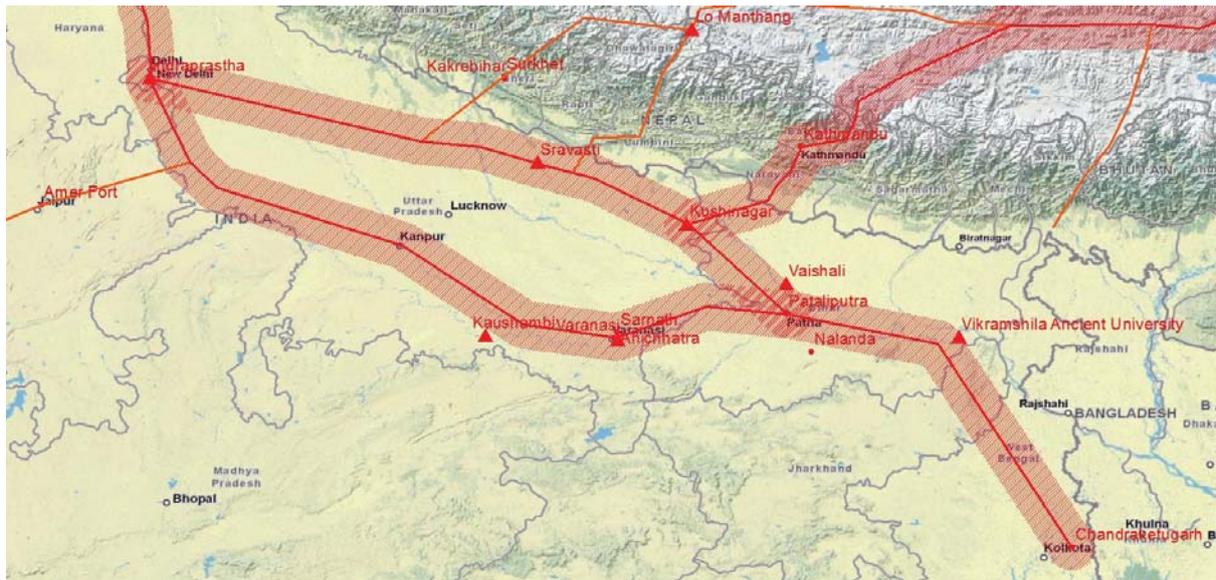


Figure 17. The wide fertile river system of the Ganges enabled sites to develop over a broad area and there were multiple routes across this landscape. At present two corridors have been defined, encompassing the main urban developments and monuments, but a single wider corridor probably would be more appropriate.

Similarly, in cases where movement was constricted by the natural topography, as with mountain passes and steep valley systems, a narrower buffer would be appropriate.

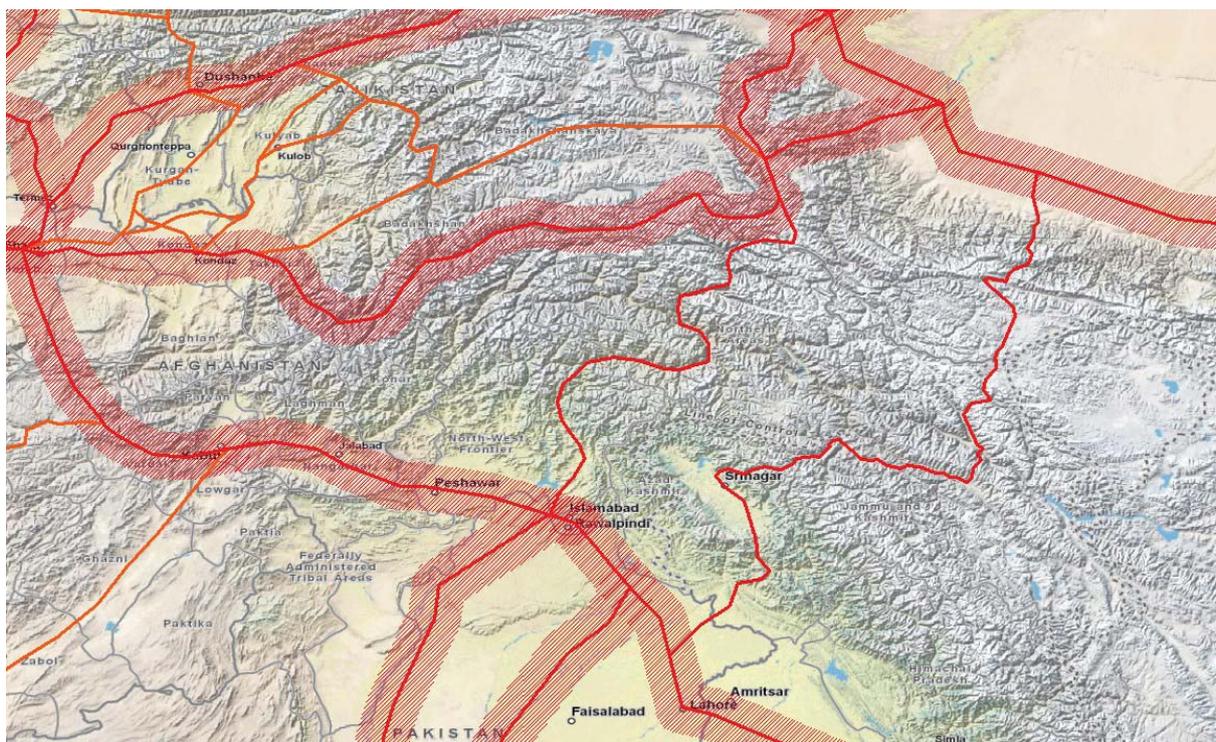


Figure 18. Mountain passes and steep-sided valleys would require a spatially much tighter definition of the corridor, which might, in places, only extend a few hundred metres from a very discreet route. Here the Karakoram highway (corridor 14) and through the high Karakoram (corridor 43) have been deliberately left un-buffered at this stage.

There is still a tension regarding the selection (or non-selection) of smaller sites. Shorter corridors might allow the project to capture a greater complexity of sites; for example the Merv to Amul section (200 km), where it could be argued that every small way-station could

be managed and protected. But overall, longer corridors capture a wider range of important sites.

7.2.5 Compilation of nomination dossiers & an overall Silk Roads framework

The *Coordinating Committee for the Silk Roads Serial Nomination*, in discussion with the UNESCO World Heritage Centre and ICOMOS advisers, will consider whether a single nomination dossier, or a number of dossiers, should be compiled for each corridor.

An overall ***Silk Roads concept*** is needed to articulate how each selected corridor contributes to the overall Silk Roads concept (Annex 1). It also needs to be clear as to why these corridors (as opposed to other corridors) were selected. This effectively exists, in draft, in this report, but can only be finalised on the basis of decisions made by the Coordinating Committee.

Each selected corridor, in its nomination dossier, would then need to provide a comparative analysis that explained how the sites *within* that corridor were selected against that Silk Roads framework and the overall Silk Roads attributes.

7.2.6 Harmonizing and developing Tentative Lists

The Tentative Lists for the various State Parties along the Silk Roads are not yet complete. Previously, in the absence of a clear overall Silk Roads framework, the compilation of Tentative Lists and individual site selection has proved to be very difficult. The exercise thus far has been very useful, in identifying individual State Parties' aspirations and in helping to focus on the range of sites available and their perceived significance.

New Tentative Lists could now be compiled against the framework presented here, focused on site selection within the chosen corridors. This should be a much quicker and easier process, requiring a more focused comparative analysis within the corridor (see above). This stage could be rapidly achieved and reviewed for each potentially nominated corridor (there would be no need to await all corridors TLs). Attention could then be rapidly focused on the substantial work of compiling appropriate documentation, management strategies and nomination dossiers.

7.3 Additional recommendations

7.3.1 Further research

There are a number of significantly under-represented regions in the current study (which has been focused on the original members of the consortium: China and the five Central Asian republics). Further work is needed to draw in more material from:

- Afghanistan; South Asia (especially Nepal, Pakistan, Bangladesh); Mongolia; the eastern Mediterranean/Middle East; the Caucasus; and the eastern extent of the routes, into Korea & Japan.

This research will undoubtedly produce a more complex picture of corridors, potentially contributing to the selection of further corridors in those areas.

7.3.2 Documentation and national inventories

There is an urgent need to promote work on national inventories³² in support of site selection within the selected corridors.

Many of the national inventory systems are quite detailed (for example, the Monument Passport system in Central Asia): but access to this information is very difficult - few are computerised. A programme to computerise the monument passport system across the five Central Asian countries, including an analysis of the structure of the current record, inventories of databases in use, and broader standards, would be a useful platform for this region.

In addition, large quantities of early records, vital to understanding the significance of the sites, are not easily accessible. There are problems with: under-curated archives; archive dispersal (e.g. the importance of the Tashkent archive, and holdings in the *Institute of Material Culture* in St Petersburg, for Central Asia); and difficult formats (e.g. large scale plans, old photographic prints, etc.).

The lack of accessible national inventories is a major limitation regarding the confidence of the current study. One hopes that most of the important sites have been identified – but that is not always the case.

In addition to archival inventory work, there is a need for:

- Developing documentation standards and shared approaches.
- Targeted survey/geophysics work to develop the documentation at some of the key sites and landscapes in each selected corridor.
- The development of an integrated programme of satellite imagery acquisition (for the nominated corridors) and its analysis.

7.3.3 Capacity building

There are a variety of areas that would be useful to support to assist the nomination process.

Specifically:

- The compilation of nomination dossiers.
- Translation of recent UNESCO guidance document (especially into Russian for the Central Asian partners)³³.
- Archaeological archives: approaches and standards.
- GIS and spatial data: storage and analysis.
- Satellite imagery: analysis.

7.3.4 Developing the role of expert groups

The establishment of expert groups would be useful to support the development of the Silk Roads nominations. To be effective, these should perhaps be focused around specific issues,

³² The recently agreed JFIT project in the Central Asian region is welcomed here.

³³ To include: the *International World Heritage expert meeting on serial nominations and properties* held in Ittingen, Switzerland (Martin & Gendre 2010).

such as data warehousing, site survey/documentation, satellite imagery, nomination dossiers, etc. Such focused groups might provide a means of encouraging dialogue, debate and shared practices. There is significant local enthusiasm for the Silk Roads project, and this needs to be mobilised.

It is likely that funding for meetings will be limited, but ‘virtual’ groups, connected via email and utilising an effective platform of data warehousing (see 7.3.5.2) to exchange information and drafts, could make considerable progress.

There are issues here of administration of such facilities, and translation of material, but these are surmountable (see section 7.3.6).

7.3.5 Digital data dissemination

7.3.5.1 Introduction

“Expert groups formed by the States Parties may provide detailed information about proposed sites to the Information Centre at the Secretariat office at Xi'an for a data base which could be shared by all the States Parties for harmonizing the Tentative List” (UNESCO 2009a, Annex 1). This aspiration has failed to develop, for a variety of reasons, but mainly the lack of focus regarding the next steps with the nomination strategy, and thus clarity as to what was needed.

It is now evident that it would be extremely useful to develop a centre, or centres³⁴, to:

- Disseminate **existing** bibliographic data (see Annex 5), digital databases and GIS data (see Annex 4), and other existing information relevant to the Silk Roads;
- Enable State Parties to **add to/enhance** the existing data, be that bibliographic (see section 7.3.5.4), site locations, site information, etc.;
- Exchange material amongst **expert groups**;
- Exchange material amongst State Parties as part of the **nomination dossier compilation**.

7.3.5.2 Data exchange & warehousing

Key issues in developing such a platform include:

- Security for storage and backup.
- Procedures for adding and updating information.
- Staff/time implications for the host(s).
- The degree of functionality provided (ranging from simply warehousing to more elaborate front-ends, maps, etc.).
- Language/translations.

³⁴ The European Commission's Central Asia Research and Education Network (CAREN) recently provided €5m to increase the internet capacity available to researchers in the Central Asia region (Kyrgyzstan, Tajikistan and Turkmenistan) which may make web based delivery of Silk Roads data more achievable: for the Press release see: <http://europa.eu/rapid/pressReleasesAction.do?reference=IP/10/1152&format=HTML&aged=0&language=EN&guiLanguage=en>

Options (not exclusive) for hosting data currently consist of:

*ICOMOS International Conservation Centre in Xi'an (IICC-X)*³⁵: established as a Silk Roads data centre and the Silk Roads Cloud, although this is not currently publicly available. There are password protected areas and it was initially designed to provide support to China and the five Central Asian republics.

*International Institute for Central Asian Studies (IICAS)*³⁶: based in Samarkand, Uzbekistan, it was established in 1995 as a direct outcome of the UNESCO Silk Roads Expeditions. It aims to bring historical and cultural issues about Central Asia to the attention of the international community and to strengthen collaboration between local scholars and colleagues abroad. In 2008 Azerbaijan, China, Iran, Kazakhstan, Korea, Kyrgyzstan, Pakistan, Tajikistan, Turkey and Uzbekistan were full members of the consortium.

*Silk Roads Cultural Heritage Resource Information System (CHRIS)*³⁷: Development of an Information System to assist in the nomination of the serial World Heritage Site, specifically focused on the Central Asian countries. The site has a variety of access and protection levels, which would be ideal for the identified activities. It is not designed, at present, to be a long-term repository for data (although website and data externally hosted with good security and backup in place), but it may act as an effective short-term delivery system until a longer-term platform can be established.

7.3.5.3 Site names and referencing

There is a need to develop standards for the referencing of sites and other features of the Silk Roads. Not least are the problems of the multiple names and spellings of individual sites, and understanding the accuracy with which they are located.

Data standards are essential, in terms of metadata and terminology, if the data being developed across many research projects and initiatives are to be useful to the widest range of researchers. This is not about shaping the content, or monitoring the accuracy, of specific research databases, inventories, etc.: this is about establishing a means of sharing and using information, while encouraging individual researchers and groups to develop new resources. Matthew Ciolek (2006) has already gone some way to establishing a baseline of information regarding nodes and routes which could provide a platform for future development.

7.3.5.4 Bibliographic data

The bibliographic information (Annex 5) will grow and develop in the coming years. Many of the State Parties have not yet had an opportunity to add their material and undoubtedly their input will ensure a wider range of source material.

It would be very useful, therefore, to hold a centralised version of a bibliographic database, in one of the data warehouses discussed above, to which new material could be added.

Two enhancements might be considered:

³⁵ <http://iicc.org.cn>

³⁶ http://portal.unesco.org/culture/en/ev.php-URL_ID=35410&URL_DO=DO_TOPIC&URL_SECTION=201.html

³⁷ <http://www.silkroad-infosystem.org/>

-
- The bibliography is currently organised under a number of basic headings. Works that pertain to wider Silk Roads issues, or cover more than one country, are not listed under individual countries, to avoid repetition. A key-worded version, to enable searching for themes, places or countries would be relatively simple and a very useful additional project.
 - At present the bibliography is primarily in English, but elements of it also exist in Russian and Chinese (for example). Translation (especially of key words), would be useful.

7.3.6 International funding and support mobilized by UNESCO

There needs to be careful consideration of the opportunities for international assistance of the Silk Roads project; especially once the *Silk Roads framework* and *nomination strategy* are agreed, as it is hoped that this will provide an effective focus for future action.

A number of capacity building and enhancement activities have been identified (above) and these should be discussed and prioritised at forthcoming meetings of the *Silk Roads Coordinating Committee*.

In addition, the first meeting of the *Silk Roads Coordinating Committee* identified the need to support “the establishment of a separate post of ‘project manager’ to oversee the whole nomination project in individual countries” (UNESCO 2009b). While these posts may be created by local State Party resources, there is a need for their integrated training and support. The suggestion of a nomination dossier mentor, made at the Almaty 2009 meeting, is worthy of consideration.

In addition, the first meeting of the committee identified the need to support “the establishment of a separate post of ‘project manager’ to oversee the whole nomination project in individual countries” (loc cit). While these may be created by local State Party resources, there is a need for their integrated training and support. The suggestion of a nomination dossier mentor, made at the Almaty 2009 meeting, is worthy of consideration.

Annexes

1 Draft Concept Statement for the Silk Roads

(From: 5th UNESCO SUB-REGIONAL WORKSHOP ON THE SERIAL WORLD HERITAGE NOMINATION OF THE SILK ROADS, 18 – 24 May 2009, Almaty, Kazakhstan: final report: drafted as a Statement of Outstanding Universal Value (OUV) before the idea of a series of corridors was suggested. It is here presented as an over-arching Concept for a series of serial nominations that will ultimately reflect the scope and extent of the Silk roads).

The Silk Roads are routes of integration, exchange and dialogue between East and West that have contributed greatly to the common prosperity of humankind for almost 2 millennia. The whole of the route is more than the sum of its constituent parts.

Flourishing in particular between the 2nd century BC and end of the 16th century AD, this network of routes, started initially from Chang'an (present-day Xi'an) and ultimately stretching from East Asia to the Mediterranean in the west, and down into the Indian subcontinent, facilitated and generated a two-way intercontinental trade in a dazzling array of trading goods. Of these, Chinese silk was among the most valuable, but it included materials such as precious metals and stones, ceramics, perfumes, ornamental woods, and spices in return for cotton and wool textiles, glass, wine, amber, carpets and the celebrated horses. This trade connected various civilizations, persisted over centuries and was sustained by a system of caravanserais, commercial settlements, trade cities and forts along its entire length of more than 10,000 km, which makes it arguably the longest cultural route in the history of humanity.

But much more than trading goods was transported over the network of Silk Roads. Buddhism, Judaism, Islam and Nestorian, Christianity, Zoroastrianism and Manichaeism spread over the Silk Roads, Scientific and technological developments were also diffused by these routes, for example from China, paper, printing, gunpowder, cast iron, the crossbow, the magnetic compass, and porcelain, whilst engineering developments (particularly bridge building), the cultivation and working of cotton, tapestry weaving, calendrical sciences, vine cultivation, as well as certain glazing and metal working techniques spread from Central Asia, Middle East, Mediterranean and the west. There was also a substantial two-way exchange of medical knowledge and medicines, as well as of what are now seen as universal fruit and other food crops. As such, the Silk Roads generated outstanding manifestations of global significance in the realms of economy, society, culture and the environment. The types of monuments, sites and cultural landscapes found along the Silk Roads can be categorized under:

- Infrastructure (facilitating trade and transportation);
- Production (of trading goods); and
- Outcomes (such as cities, art, knowledge as a result of contact and exchange).

The property includes outstanding examples of types of heritage under these categories.

Attributes include:

- Topographical and natural features
- Urban patterns and architectural designs
- Socio-economic development

-
- Political events
 - Religious and spiritual values
 - Achievements in science and technology
 - Achievements in the arts (sculpture, painting, carving, etc.)
 - Intangible heritage

Under Category 1 Infrastructure, the sites among others, comprises caravanserais and inns; military posts, garrison stations and fortifications; bridges; irrigation systems; natural and cultural landmarks.

Under Category 2 Production the sites reflect mining, metal working, manufacturing and handicrafts, and other industrial and production sites.

Under Category 3 Outcomes the sites include trade cities, urban centres and settlements; religious, spiritual and ceremonial sites (including shrines, caves, tombs, sites of pilgrimage); and places of associations with political events, transfer of ideas, language, music, dance, poetry, etc.

2 Tentative list sites from the study area

This list below includes sites identified on specific Silk Roads Tentative Lists, produced by: People's Republic of China, Republic of India, Republic of Kazakhstan, Kyrgyz Republic, Republic of Tajikistan, Turkmenistan, and Republic of Uzbekistan. For countries who have not yet submitted a Silk Roads list (Afghanistan, Islamic Republic of Iran¹, Republic of Iraq, Republic of Lebanon, Federal Democratic Republic of Nepal, Islamic Republic of Pakistan, Syrian Arab Republic, and Republic of Turkey) sites already on the State Party Tentative Lists that are of clear relevance (e.g. Seljuk Caravanserais on the route from Denizli to Doğubeyazıt in Turkey) are also listed.

Tentative List sites from other countries with a potential interest in joining the project (Republic of Armenia, Republic of Azerbaijan, People's Republic of Bangladesh, Kingdom of Bhutan, The State of Israel, Japan, Hashemite Kingdom of Jordan, Republic of Korea, The Democratic People's Republic of Korea, Mongolia and the State of Palestine) are not listed here.

For full up-to-date listings see the World Heritage Centre Tentative List website page at: <http://whc.unesco.org/en/tentativelists/>

Country	Site Name
Afghanistan	Herat Old City
Afghanistan	City of Balkh (antique Bactria)
Afghanistan	Bagh-e Babur
China	Yulin Grottoes
China	White Horse Temple (Luoyang)
China	Luoyang city of Han and Wei Dynasties
China	Gongyi Stone Cave Temple
China	Site of the Chang'an City of Tang Dynasty
China	Guoyuan - Xincheng Tomb Complex
China	Ancient City of Loulan
China	Buddha Subash Temple Site
China	Taizang Tower
China	Ancient City of Gaochang and Astana Cemetery
China	Site of the Chang'an City of Han Dynasty
China	Xuanquanzhi Site
China	The Dagoba of Kumarajiva
China	Cemetery of Northern Dynasties and Sui and Tang Dynasty in Guyuan
China	Great Buddha Temple
China	Niya
China	Camel City Site and Tomb Complex
China	Suoyang City Site and Tomb Complex
China	Site of Yunen Gate and Hecang City
China	Bingling Temple Grottoes (Xia Temple)
China	Shuiliandong (Water Curtain Cave) Grottoes (Lashao Temple)
China	Ancient City of Jiao River

¹ Iran put in a broad descriptive statement regarding 'Silk Route (Also as Silk Road)' in 2008, but this does not include any specific sites. However, a large number of sites on the Iranian Tentative List are relevant (see below).

China	Qian Imperial Mausoleum - Xianyang City
China	Daqin Monastery Pagoda
China	Kizil Grottoes
China	Quanzhou City
China	Ningbo City
China	Mehmud Qeshqeri Tomb
China	Toyuk Grottoes
China	Bezeklik Grottoes
China	Simsem Grottoes
China	Mao Imperial Mausoleum of Han Dynasty and Tomb of Huo Qubing
China	Tomb of Zhang Qian - Hanzhong City
China	Maijishan Grottoes - Immortal Cliff Grottoes
China	Historic City of Guyuan
China	Xi'an Mosque
China	Great Buddha Temple Grottoes in Bin County - Xianyang City
China	Zhao Imperial Mausoleum -Xianyang City
China	The Underground Chamber of Famen Temple - Baoji City
China	Xingjiao Temple Pagoda
China	Site of Kaicheng
China	Luoyang City of the Sui and Tang Dynasties
China	Mount Xumi Grottoes
China	Kumtula Grottoes
China	Han'gu Pass and Xiaohan Ancient Path in Han Dynasty
China	Mati Temple Grottoes - Jiata Temple and Qianfo (thousand Buddhas) Cave
India	Sravasti
India	Arikamedu, Early Historic Site
India	Ancient Site and Buddhist Stupa (Sanghol)
India	Ruins of Ancient Vaishali
India	Mound locally known as Burud Kot (Nalla Sopara Stupa) Maharashtra
India	Buddhist remains of Kushinagar
India	Kaushambi
India	Remains of Vikramshila Ancient University
India	Indraprastha
India	Ahichhatra
India	Excavated Remains of Kaveripattinam
India	Ancient monastery and stupa together with adjacent land (Harwan)
India	Excavated Remains at Nalanda
Iran	The Historical Structure of Yazd
Iran	Hegmataneh
Iran	Jiroft
Iran	The Collection of Historical Bridges
Iran	Qanats of Gonabad
Iran	Zozan
Iran	Tape Sialk
Iran	The Historical Village of Abyaneh
Iran	Cultural Landscape of Alamout
Iran	The Historical City of Maybod
Iran	Historic monument of Kangavar
Iran	Bazaar of Qaisariye in Laar
Iran	Ribat-i Sharaf
Iran	The Sepulcher Towers (Gonbad-e Ghabous)
Iran	The Historical–Cultural Axis of Fin, Sialk, Kashan

Iran	Firuzabad Ensemble
Iran	Shush
Iran	Jame' (Congregational) Mosque of Esfahan
Iran	Historic ensemble of Qasr-e Shirin
Iran	Taq-e Bostan
Iran	Historic ensemble of Sheikh-Safi-ed-Din Ardebili
Iran	St.Tatavoos Cathedral (Qara-Kelissa)
Iran	Nasqsh-e Rostam and Naqsh-e Rajab
Iran	Shahr-e Sukhteh
Iran	Siraf
Iran	Kerman Historical-Cultural Structure
Iran	Kuh-e Khuaja
Iran	The Historical Texture of Damghan
Iran	Bastam and Kharghan
Iran	Kaboud Mosque, Tabriz
Iran	Tous Cultural Landscape
Iran	The Historical City of Masouleh
Iran	Historic-Natural Axis of Isfahan City
Iran	Baba Loghman
Iran	Ghaznavi- Seljukian Axis in Khorasan
Iran	Ribat Mahi
Iran	Khorrambad Valley
Iran	The Complex of Izadkhast
Iraq	Erbil Citadel
Iraq	The Fortress of Al-Ukhaidar
Iraq	The Site of Thilkifl
Iraq	Wadi Al-Salam Cemetery in Najaf
Iraq	Wasit
Kazakhstan	Talgar
Kazakhstan	Archaeological sites of Otrar Oasis
Kazakhstan	Cultural landscape of Ulytau
Kazakhstan	Karatau, Bes-shatyr (saka barrows site in Almaty region)
Kazakhstan	Turkic sanctuary of Merke
Kyrgyzstan	Barskoon
Kyrgyzstan	Manas Ordo
Kyrgyzstan	Krasnaya Rechka
Kyrgyzstan	Uzgen
Kyrgyzstan	Koshoi-Korgon
Kyrgyzstan	Suyab
Kyrgyzstan	Burana
Kyrgyzstan	Tosor
Kyrgyzstan	Safid Bulan
Kyrgyzstan	Kochkor
Kyrgyzstan	Shyrdakbek
Kyrgyzstan	Shorobashat
Kyrgyzstan	Manakeldy
Kyrgyzstan	Khan Dobo
Lebanon	Orontes Valley
Nepal	Medieval Earthen Walled City of Lo Manthang
Nepal	Bhurti Temple Complex of Dailekh
Nepal	Medieval Settlement of Kirtipur
Nepal	Sinja valley

Nepal	The Medieval Town of Tansen
Nepal	Vajrayogini and early settlement of Sankhu
Pakistan	Archaeological Site of Ranigat
Pakistan	Tomb of Bibi Jawindi, Baha'al-Halim and Ustead and the Tomb and Mosque of Jalaluddin Bukhari
Pakistan	Shahbazgarhi Rock Edicts
Pakistan	Port of Banbhore
Pakistan	Mansehra Rock Edicts
Pakistan	Baltit Fort
Pakistan	Tomb of Hazrat Rukn-e-Alam, Multan
Syria	Noréas de Hama
Syria	Apamée (Afamia)
Syria	Tartus: la cité-citadelle des Croisés
Syria	Dura Europos
Syria	Raqqa-Ràfiqa: la cité abbasside
Syria	Un Château du désert: Qasr al-Hayr ach-Charqi
Syria	Simeon Citadel and Dead Cities
Tajikistan	Yamchun Castle
Tajikistan	Ancient town of Shahristan (Kahkakha)
Tajikistan	Hissar Castle
Tajikistan	The Site of Ancient Town of Takhti-Sangin
Tajikistan	The Site of Ancient Town of Baitudasht IV
Tajikistan	Mausoleum of "Khoja Mashkhad"
Tajikistan	Buddhistic cloister of Ajina-Tepa
Tajikistan	Palace of the governor of Khulbuk
Tajikistan	Hodja Nashron Mausoleum
Tajikistan	Amir Khamza Khasti Podshoh Mausoleum
Tajikistan	The Site of Ancient Town of Pyanjekent
Tajikistan	Mausoleum of "Mukhammad Bashoro"
Turkey	Historic City of Ani
Turkey	Harran
Turkey	Mardin Cultural Landscape
Turkey	Seljuk Caravanserais on the route from Denizli to Doğubeyazıt
Turkey	The Citadel and the Walls of Diyarbakir
Turkey	The Tombstones of Ahlat the Urartian and Ottoman citadel
Turkey	Harran and Sanliurfa
Turkmenistan	Kyone-Kaka
Turkmenistan	Sakhsenem urban site (medieval Suburun) and suburb garden
Turkmenistan	Mishrian
Turkmenistan	Pulkhatyn bridge
Turkmenistan	Old Sarakhs (urban site and Abul-Fazl mausoleum)
Turkmenistan	Durun and Ak Ymam mausoleum
Turkmenistan	Yzmykshir fortress (medieval Zamakhshar)
Turkmenistan	Ygdy gala
Turkmenistan	Amul
Turkmenistan	Diyarbakir
Turkmenistan	Akcha-kala
Turkmenistan	Geok-Gumbez
Turkmenistan	Chilburj
Turkmenistan	Gebekly
Turkmenistan	Khurmuzfarra (Uly Kishman)
Turkmenistan	Gurtly-depe (medieval Bashan)

Turkmenistan	Mele-Hairam temple complex
Turkmenistan	Abiverd
Turkmenistan	Devkesen (medieval Vazir)
Turkmenistan	Odemerghen-gala (Rabat Suran)
Turkmenistan	Injirli
Turkmenistan	Anau urban site and ruins of the mosque of Said Jamal-ad-Din
Turkmenistan	Meana-Baba architectural complex
Turkmenistan	Dashrabat (Dandanakan)
Turkmenistan	Astana-Baba architectural complex and Alamberdar mausoleum in Astana-Baba settlement (medieval Maimarg)
Turkmenistan	Dayakhatyn caravanserai
Turkmenistan	Dargan urban site
Turkmenistan	Ekedeshik
Turkmenistan	Talkhatan-baba (mosque)
Uzbekistan	Ahsiket
Uzbekistan	Khazarasp
Uzbekistan	Kanka
Uzbekistan	Historic Center of Qoqon
Uzbekistan	Ancient Termiz
Uzbekistan	Shahruhiya
Uzbekistan	Varakhsha
Uzbekistan	Big Guldursun (Desert Castles of Ancient Khorezm)
Uzbekistan	Pil Qala (Desert Castles of Ancient Khorezm)
Uzbekistan	Anka Qala (Desert Castles of Ancient Khorezm)
Uzbekistan	Djanbas Qala (Desert Castles of Ancient Khorezm)
Uzbekistan	Ancient Pap
Uzbekistan	Ak Astana-baba (mausoleum)
Uzbekistan	Kurgashin Qala (Desert Castles of Ancient Khorezm)
Uzbekistan	Poykent
Uzbekistan	Minaret in Vobkent
Uzbekistan	Chashma-Ayub Mausoleum
Uzbekistan	Chor-Bakr
Uzbekistan	Bahoutdin Architectural Complex
Uzbekistan	Rabati Malik Caravanserai
Uzbekistan	Mir-Sayid Bakhrom Mausoleum
Uzbekistan	Complex of Sheikh Mukhtar-Vali (mausoleum)
Uzbekistan	Andijon
Uzbekistan	Koy-Kirilgan Qala (Desert Castles of Ancient Khorezm)
Uzbekistan	Arab-Ata Mausoleum
Uzbekistan	Toprak Qala (Desert Castles of Ancient Khorezm)
Uzbekistan	Khanbandi (dam)
Uzbekistan	Ayaz Qala (Desert Castles of Ancient Khorezm)

Table 6. Tentative List sites from the study area.

3 Selected corridors

A gazetteer of corridors of all the corridors identified in the study has been compiled, drawing upon the information in the database (Annex 4.2) and GIS system (Annex 4.3). The gazetteer will be distributed in a digital format (Williams forthcoming a & b).

3.1 Introduction

A few points of note:

- The corridors have been numbered in no particular order and numbering does not reflect importance.
- The length of the corridor has no relationship to their potential significance, but rather reflects their geo-political and geographic context (e.g. routes along desert margins, along river valleys, or mountain piedmont).
- Nominations are likely to be of a sub-set of corridor, reflecting the most important sites and landscapes that represent the OUV of the nomination.
- The principle routes have been defined in **segments** linking major **nodes** (cities). Initially a buffer of 30km either side of the main route (i.e. a 60km wide **corridor**) has been defined to capture sites/landscapes along the segments.

3.2 Selected corridors

Listed below are some of the potentially significant corridors for consideration in the nomination strategy. The list is not meant to be exclusive.

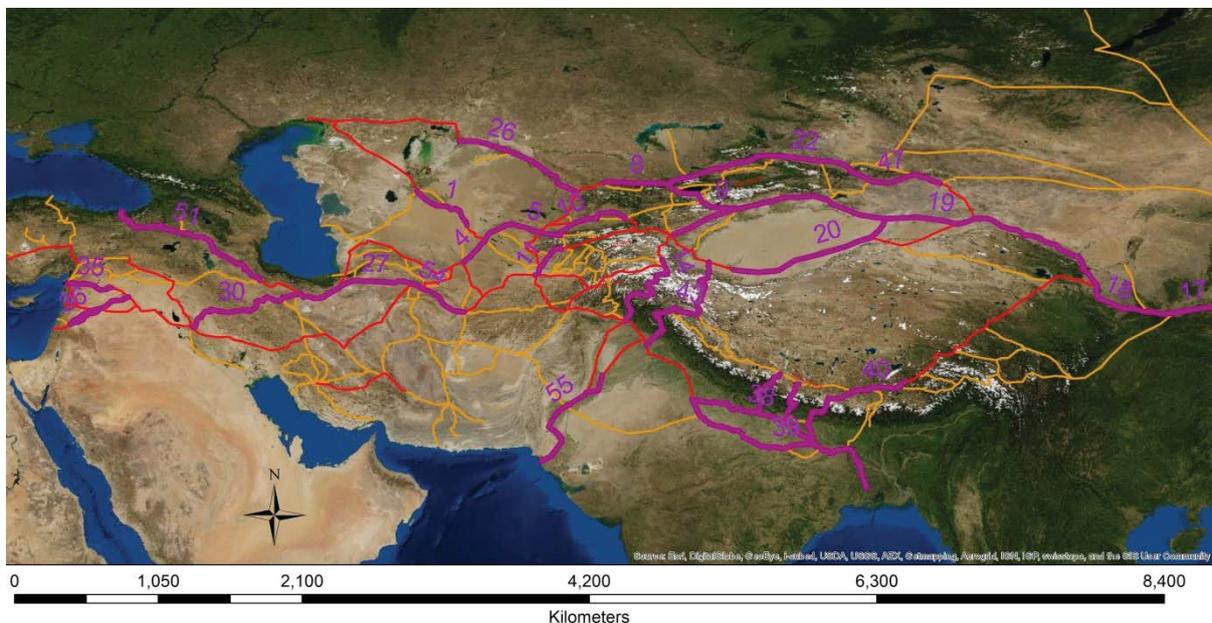
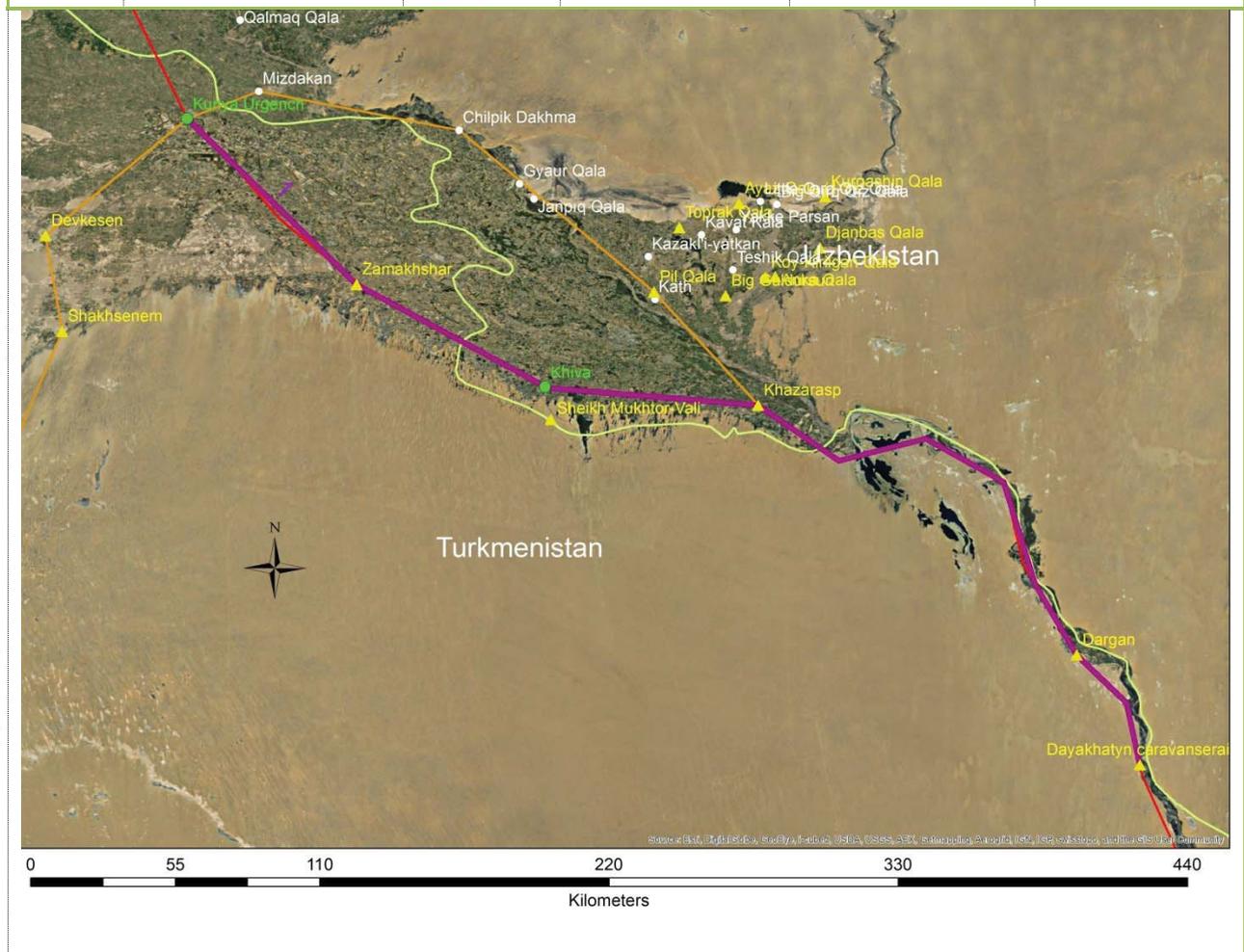
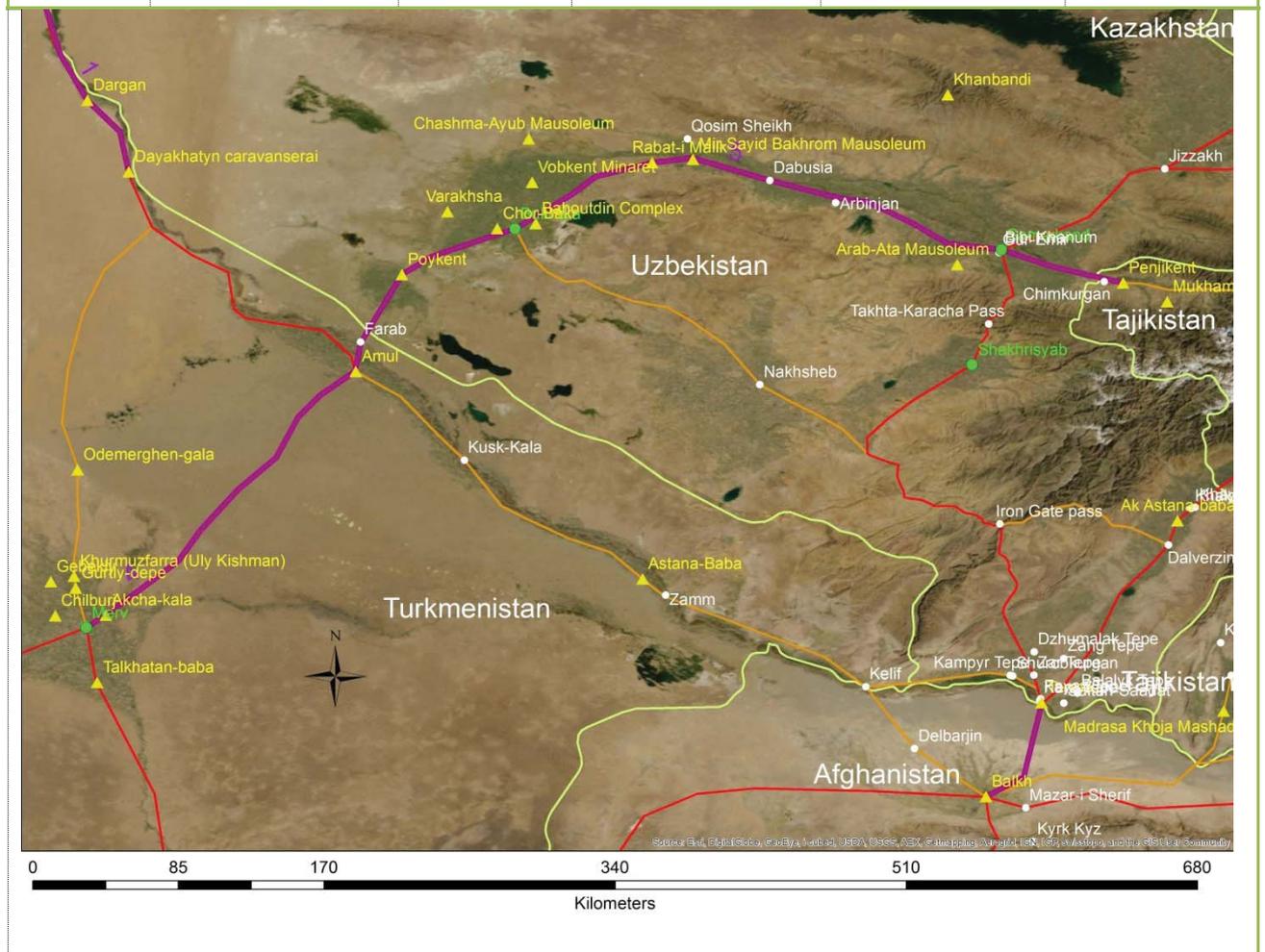


Figure 19. Some selected corridors (or parts of corridors) highlighted in purple (details in next figures).

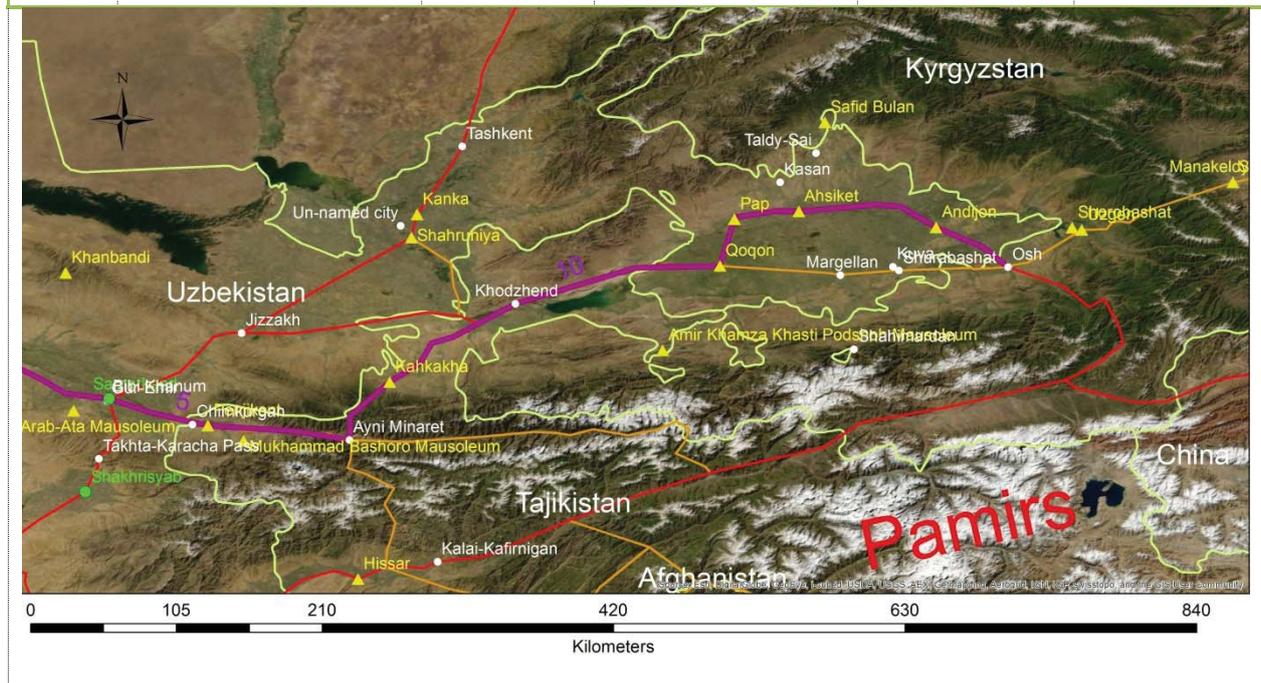
No.	Corridor	Distance (km)	Reason (1) – eco-geographic	Reason (2) - cultural	State Parties
1 (part)	<p>The Silk Roads: along the Oxus Amu Darya) - Dayahatyn to Kunya Urgench.</p> <p>Case for expanding corridor to encompass routes on north bank and leading southwest from Kunya Urgench to Devkesen & Shakhsem.</p>	410	Narrow river valley, in places deeply incised, with fertile zones along littoral, and wider fertile lands in Khorezm oasis/Amu Darya delta.	Important route, with major centres of urban and artistic development in Khorezm. Important range of site types, including small towns, forts and caravanserai.	Uzbekistan & Turkmenistan



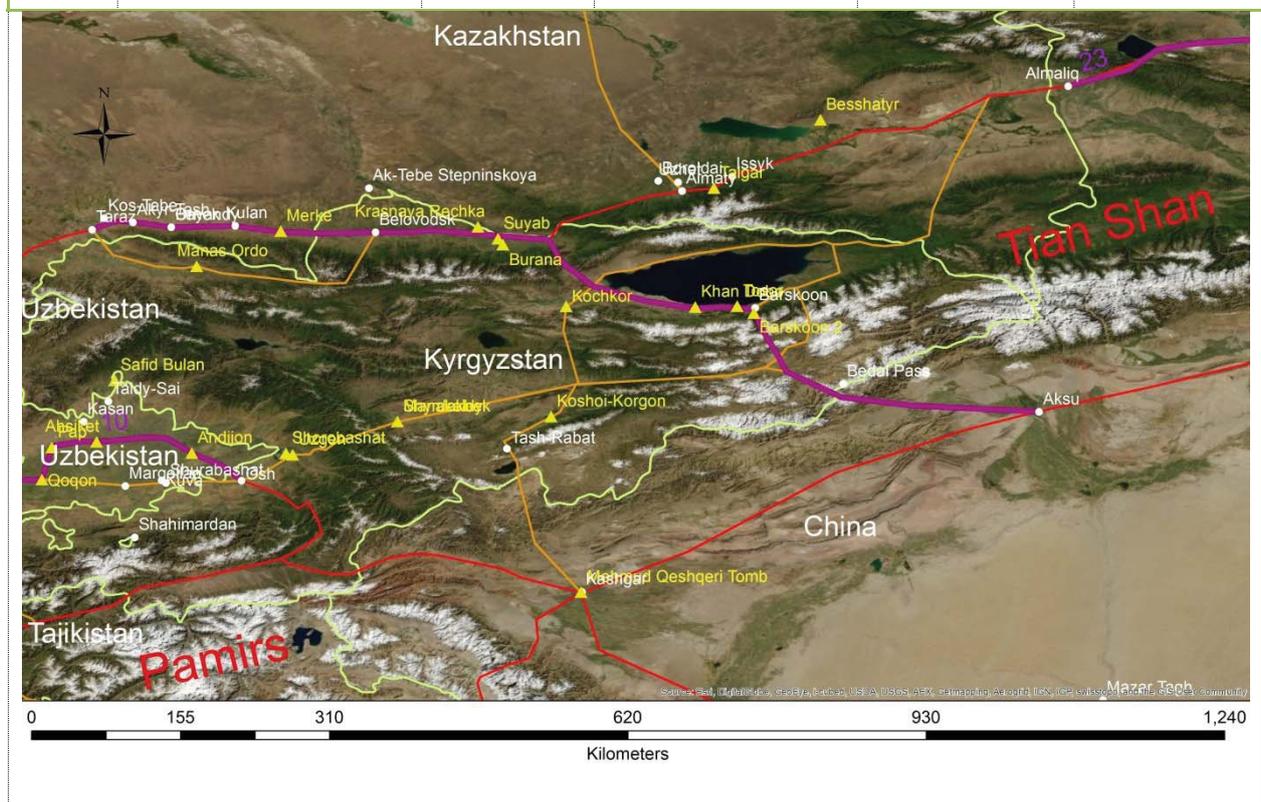
No.	Corridor	Distance (km)	Reason (1) – eco-geographic	Reason (2) - cultural	State Parties
4 & 5 (part)	The Silk Roads: crossing the Oxus and the desert – Penjikent to Merv	610	From wide fertile valleys, across the desert and river, to the Murghab delta.	An iconic route. Strategically crucial and supported large volume of movement.	Uzbekistan, Tajikistan & Turkmenistan



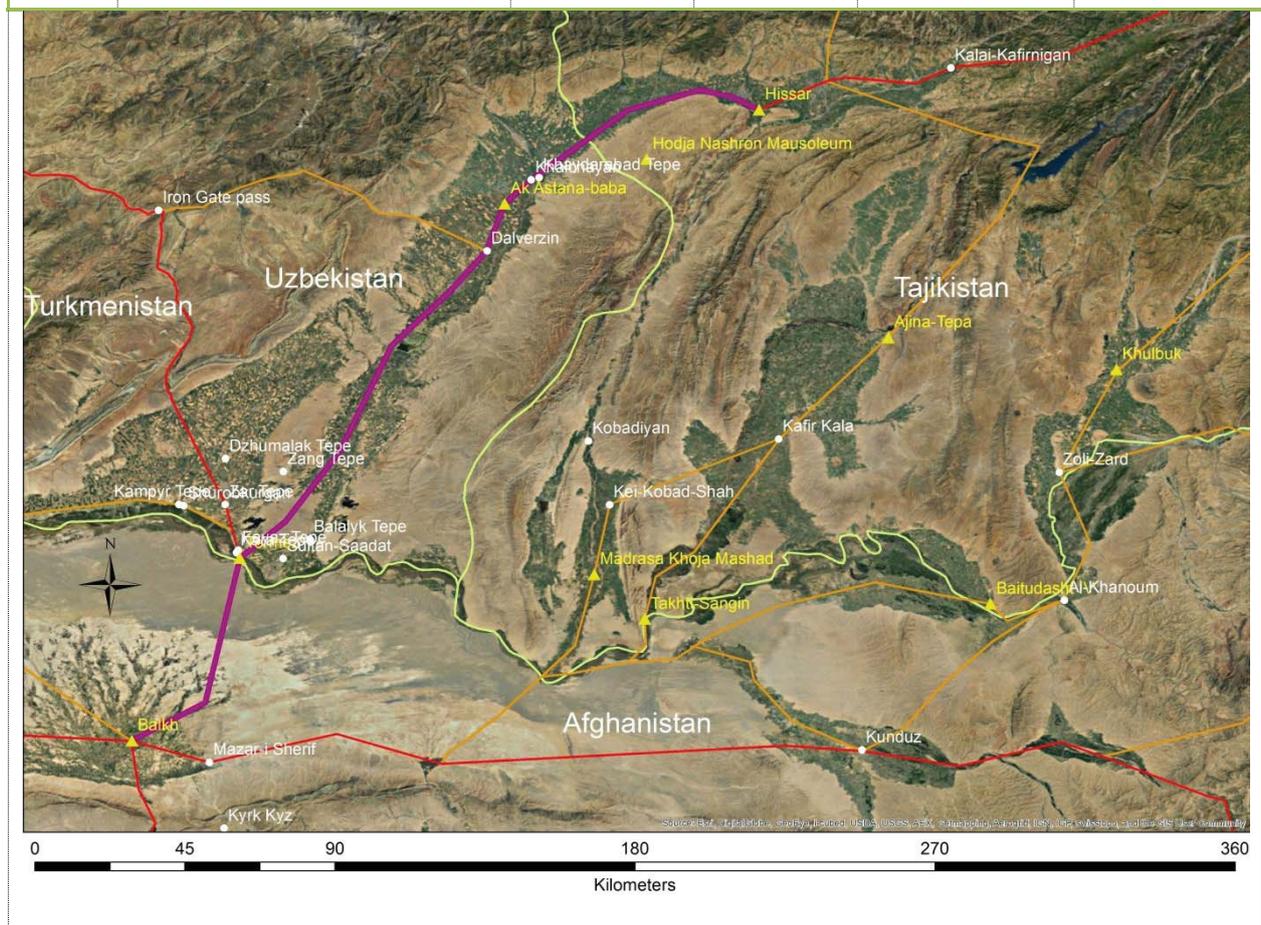
No.	Corridor	Distance (km)	Reason (1) – eco-geographic	Reason (2) - cultural	State Parties
6 & 10	The Silk Roads: the fertile valleys of Central Asia (the Zarafshan & Ferghana Valleys) – Osh to Penjikent/Samarkand	598	Piedmont of Turkestan and Pamir-Alay range, fertile zone between Zarafshan and Ferghana valleys. Linked to Taklamakan desert by high mountain passes, via Surkhab valley and the Alay/ Chyirchyk pass.	Interface between a number of empire systems (e.g. limits Parthian Empire, with regional capital at Khodzend - Antiochia in Scythia), and sometimes independent states. Hugely influential cultural exchanges and strategic locations	Kyrgyzstan, Tajikistan & Uzbekistan



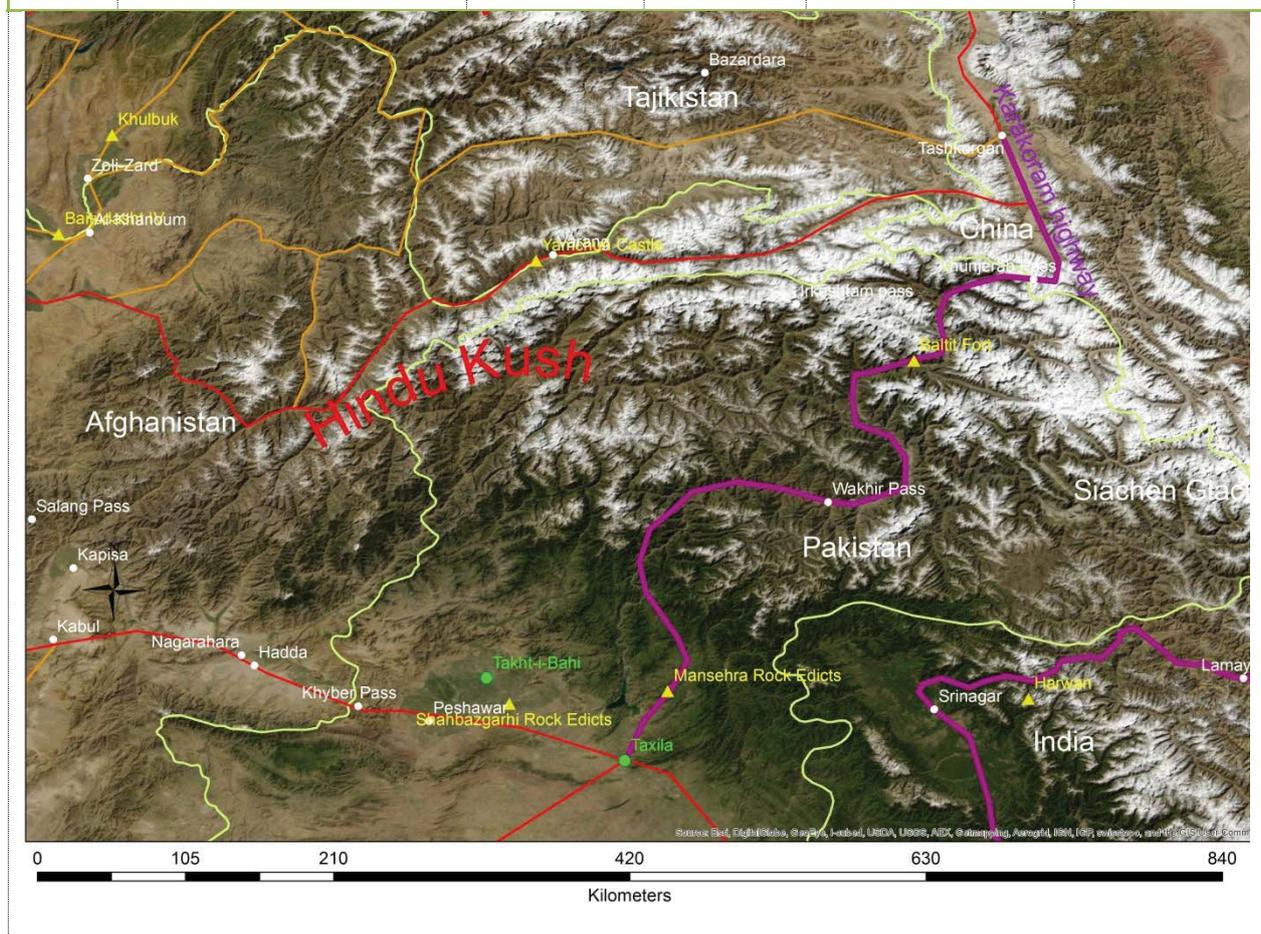
No.	Corridor	Distance (km)	Reason (1) – eco-geographic	Reason (2) - cultural	State Parties
8 & 9	The Silk Roads: The shores of Lake Issyk Kul & the Chu valley – Aksu to Taraz	804	Piedmont of Kirghiz Mountain range, Chu river valley, and along southern Issyk-Kul shore line. Fertile lands with plentiful water supply. Upper section of the Chu Valley has fairly high mountain passes, connecting Issyk Kul and Aksu.	Fertile region that supported a major development of urban centres and large scale movements of people and materials, over a considerable period of time.	China, Kyrgyzstan, Kazakhstan



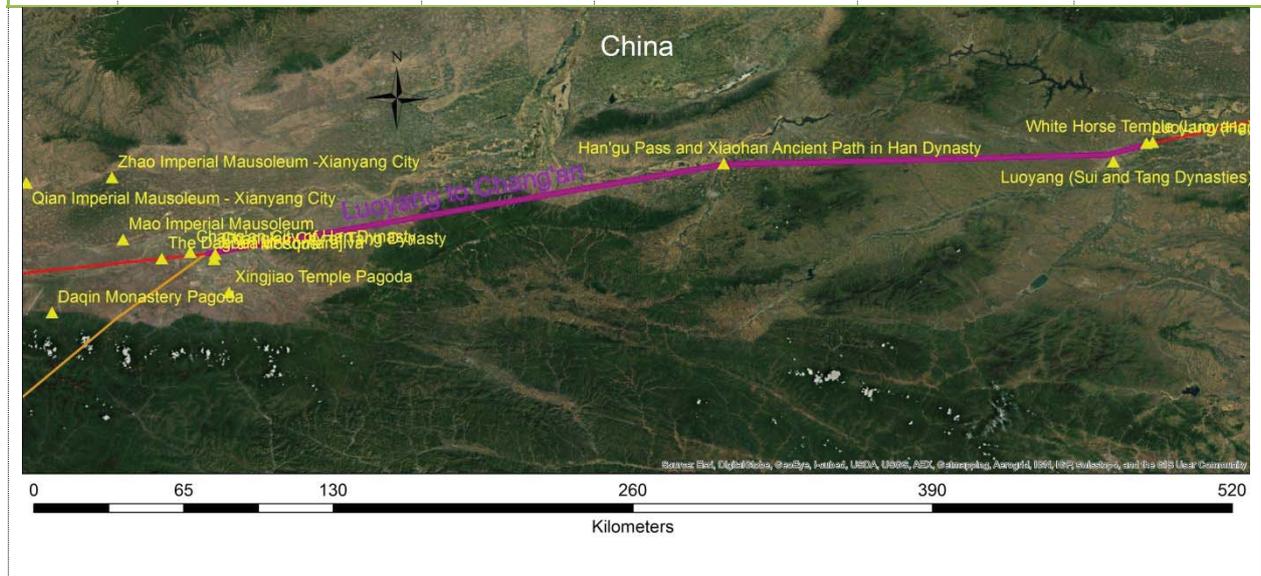
No.	Corridor	Distance (km)	Reason (1) – eco-geographic	Reason (2) - cultural	State Parties
11 & 16	The Silk Roads: the heart of Central Asia – Hissar to Balkh	255	Lower Surkhon Darya River, joins Amu Darya – a largely shallow valley route. Marginal desert to fertile oasis Balkh.	Crucial area of interaction, with numerous important cities flourishing on north-south as well as east-west connections.	Afghanistan, Tajikistan & Uzbekistan



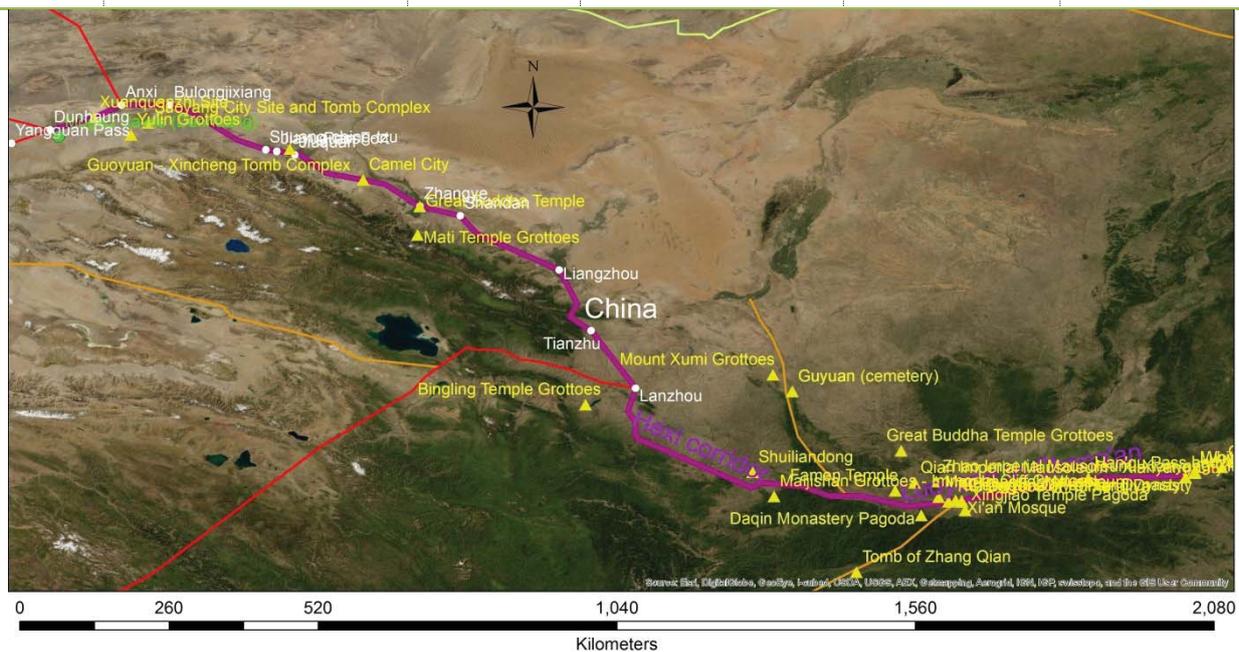
No.	Corridor	Distance (km)	Reason (1) – eco-geographic	Reason (2) - cultural	State Parties
14	The Silk Roads: the Karakoram highway (via the Khunjerab and Wakhir Passes) - Tashkurgan to Taxila	681	Mountain route, using narrow river valleys and high mountain passes	Links between China and sub-continent formalised under the Kushan Empire – accessed chiefly through this corridor.	China & Pakistan



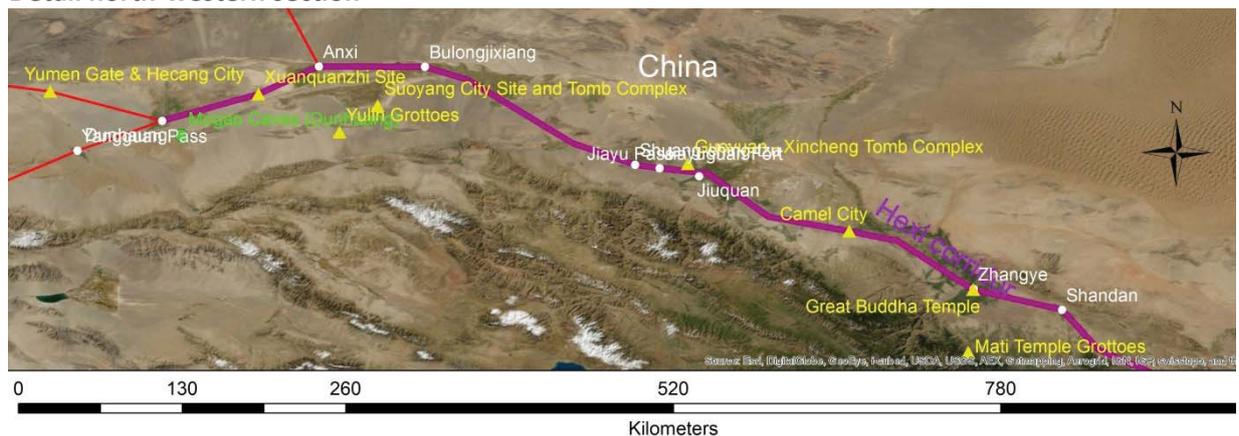
No.	Corridor	Distance (km)	Reason (1) – eco-geographic	Reason (2) - cultural	State Parties
17	The Silk Roads: the Imperial cities – Louyang to Chang’an	387	Characterised by fertile plains alongside major river systems, supporting large urban populations.	Reflects the key Han, Wei, Sui and Tang dynasty capitals, with their major impact on the development of Chinese urbanism and the arts.	China



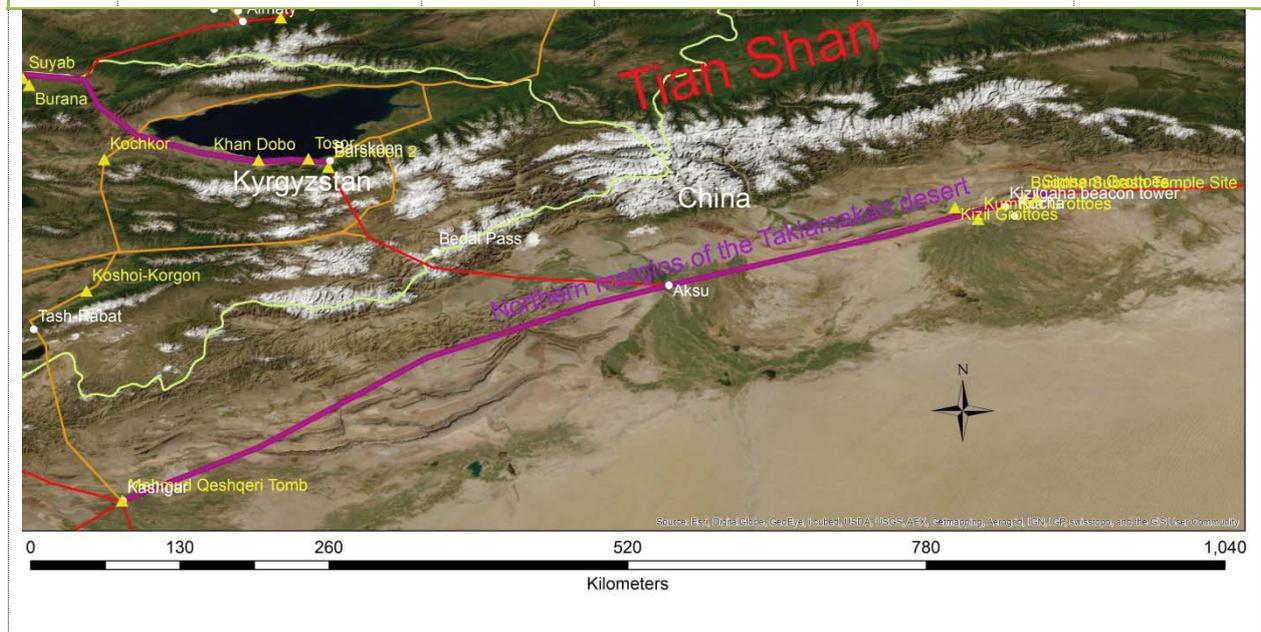
No.	Corridor	Distance (km)	Reason (1) – eco-geographic	Reason (2) - cultural	State Parties
18	The Silk Roads: the Hexi corridor – Chang’an to Dunhuang	1,600	Key landscape of control for most journeys between the West and China. Narrow passes, key strategic landscape.	Major infrastructure (way stations and forts) and significant outcomes, particularly with regard to religious sites.	China



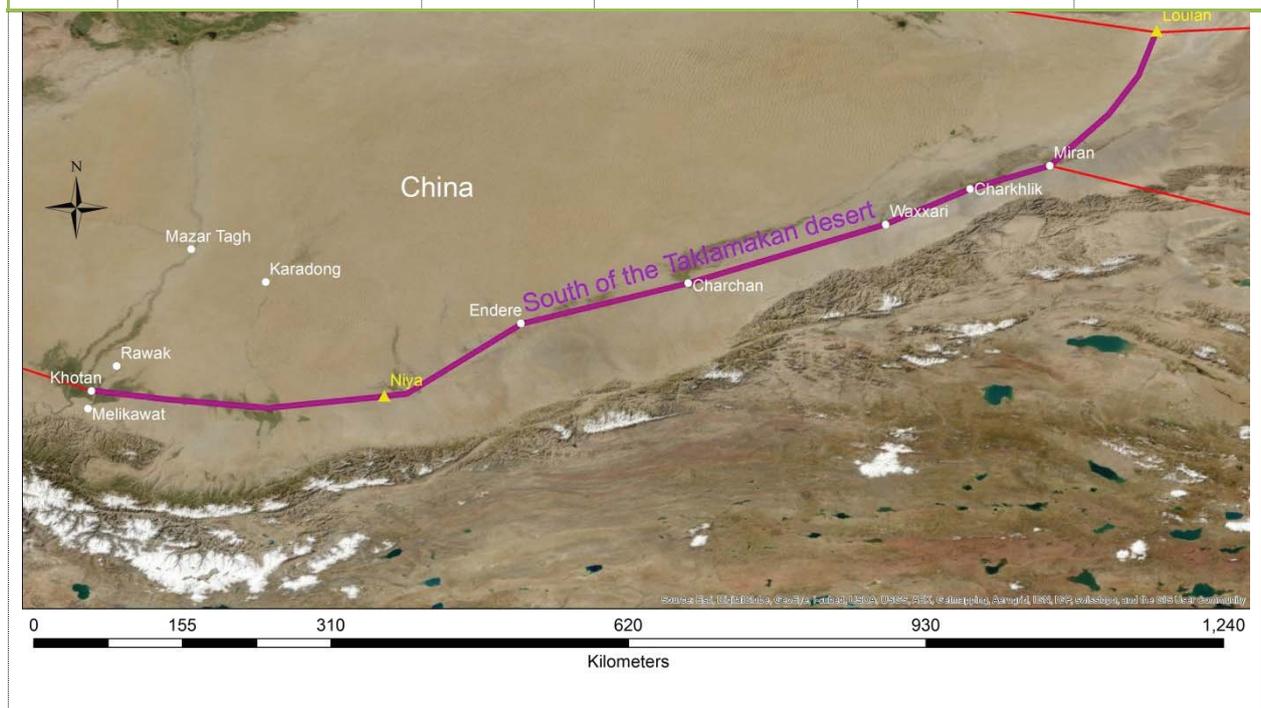
Detail north-western section



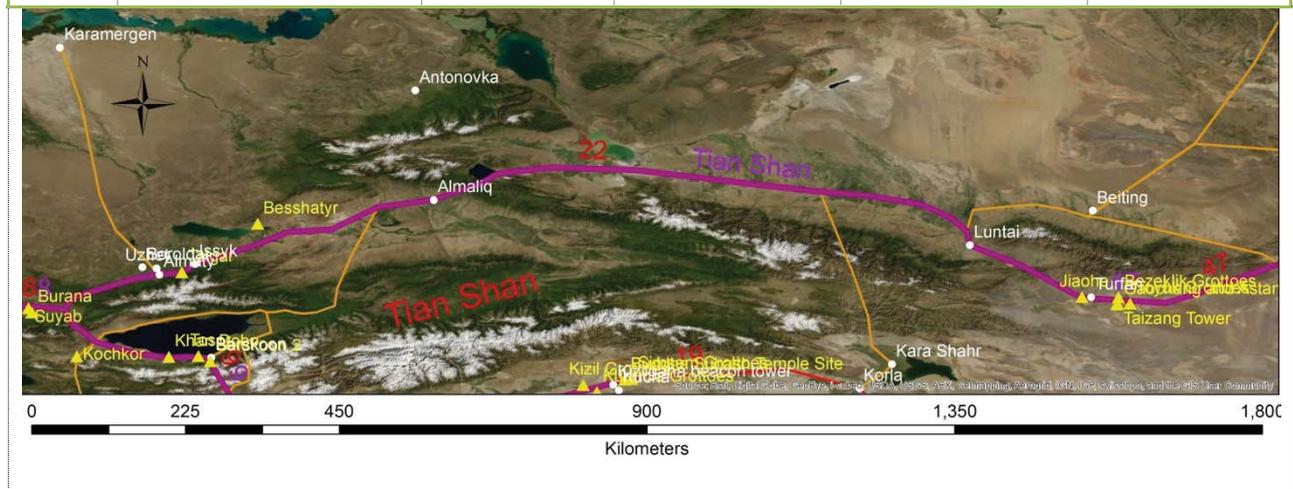
No.	Corridor	Distance (km)	Reason (1) – eco-geographic	Reason (2) - cultural	State Parties
19 (part)	The Silk Roads: the northern margins of the Taklamakan desert – Kucha and then Kashgar	668	Southern piedmont of the Tian Shan: largely desert route punctuated with seasonal oases.	Crucial landscape for infrastructure of Silk Roads – adaptation and control of this essential to many east-west journeys.	China



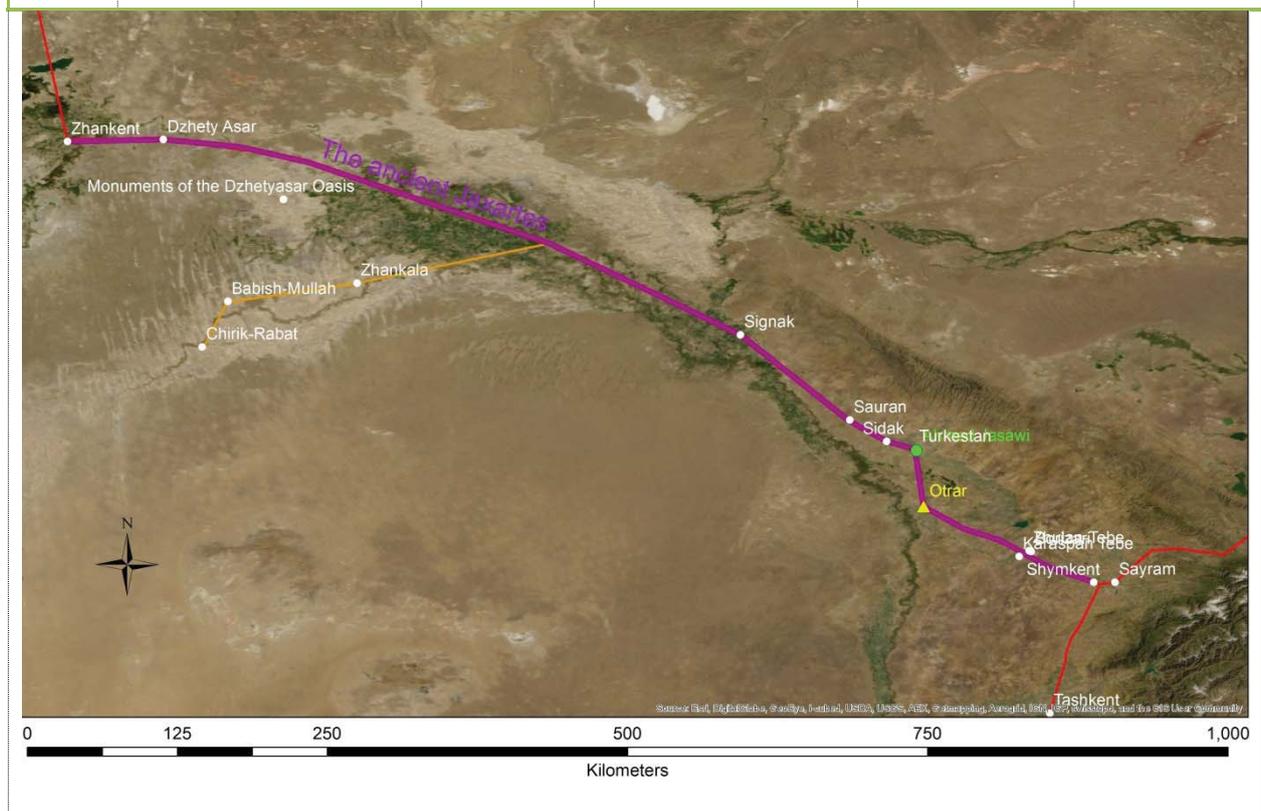
No.	Corridor	Distance (km)	Reason (1) – eco-geographic	Reason (2) - cultural	State Parties
20	The Silk Roads: The oases route south of the Taklamakan desert – Loulan to Miran and then to Khotan	1,017	Southern desert fringe punctuated with seasonal oases.	Important landscape for control of routes to south and west – different adaptations, chronologies and empire systems to the northern routes (19). Different chronology of use to northern route.	China



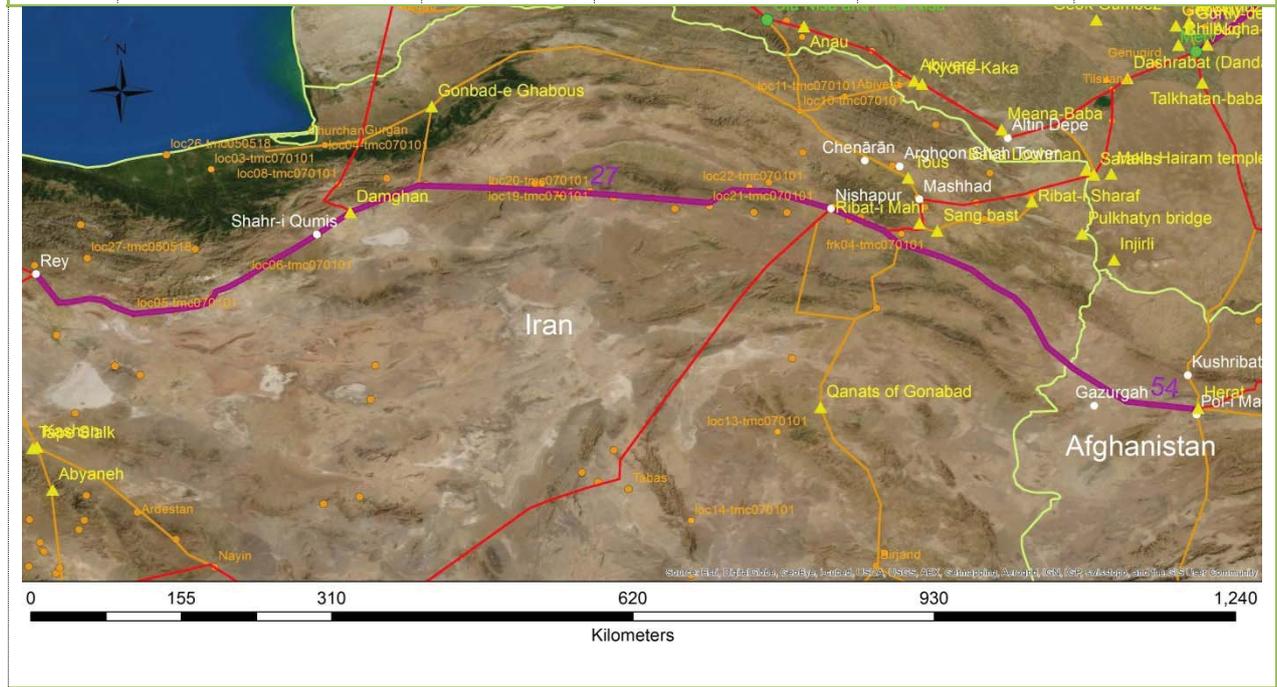
No.	Corridor	Distance (km)	Reason (1) – eco-geographic	Reason (2) - cultural	State Parties
22	The Silk Roads: Issyk-Kul to Turfan, the northern Tian-Shan route		Complex landscape of deserts and arid basins.	Major irrigation systems and key development of northern routes and associated socio-political development.	China



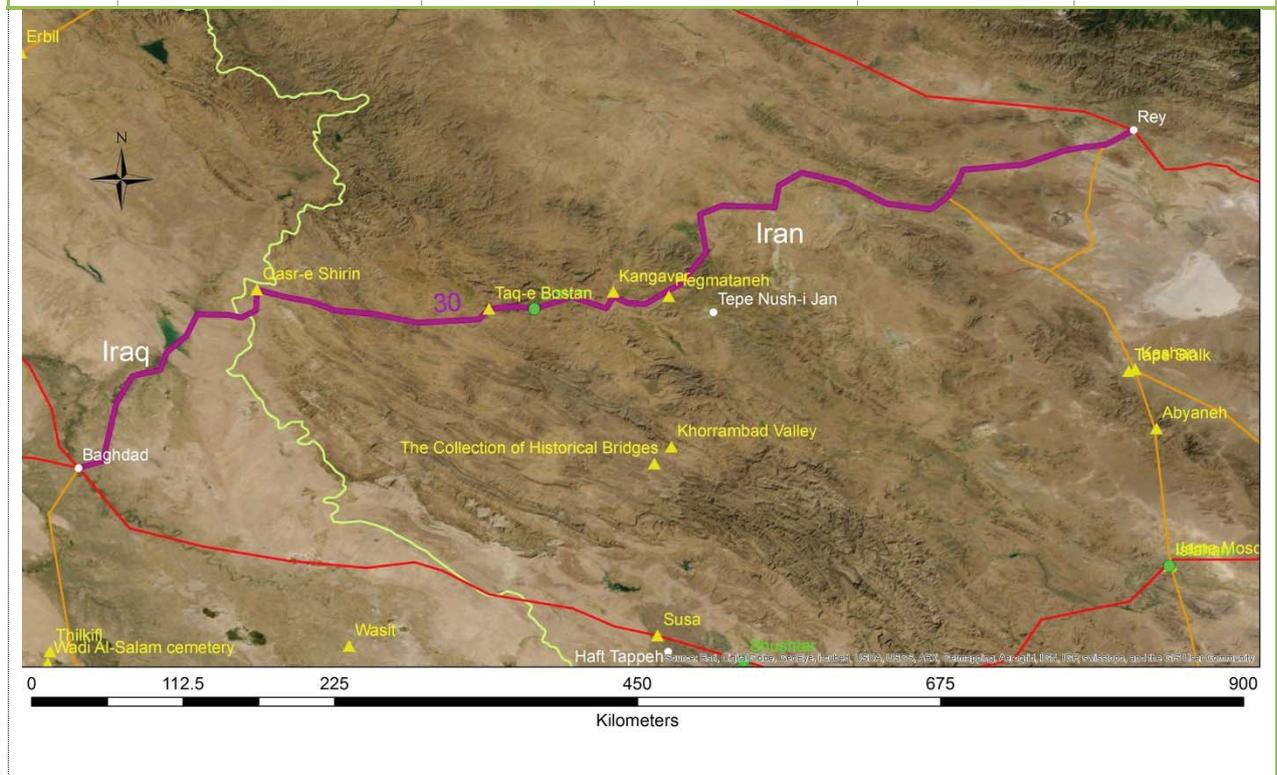
No.	Corridor	Distance (km)	Reason (1) – eco-geographic	Reason (2) - cultural	State Parties
26 (part)	The Silk Roads: along the banks of the ancient Jaxartes (Syr Darya) – Zhankent to Shymkent via Otrar, Sauran, etc.	729	Along the Syr Darya, in a shallow valley with a large fertile zone and the Aral Sea littoral (much greater extent than today). Complex river systems and runoff to Syr Darya.	Complex development of city-states, often quite independent from southern areas: important social and political outcomes along fertile route, with local adaptations to control.	Kazakhstan



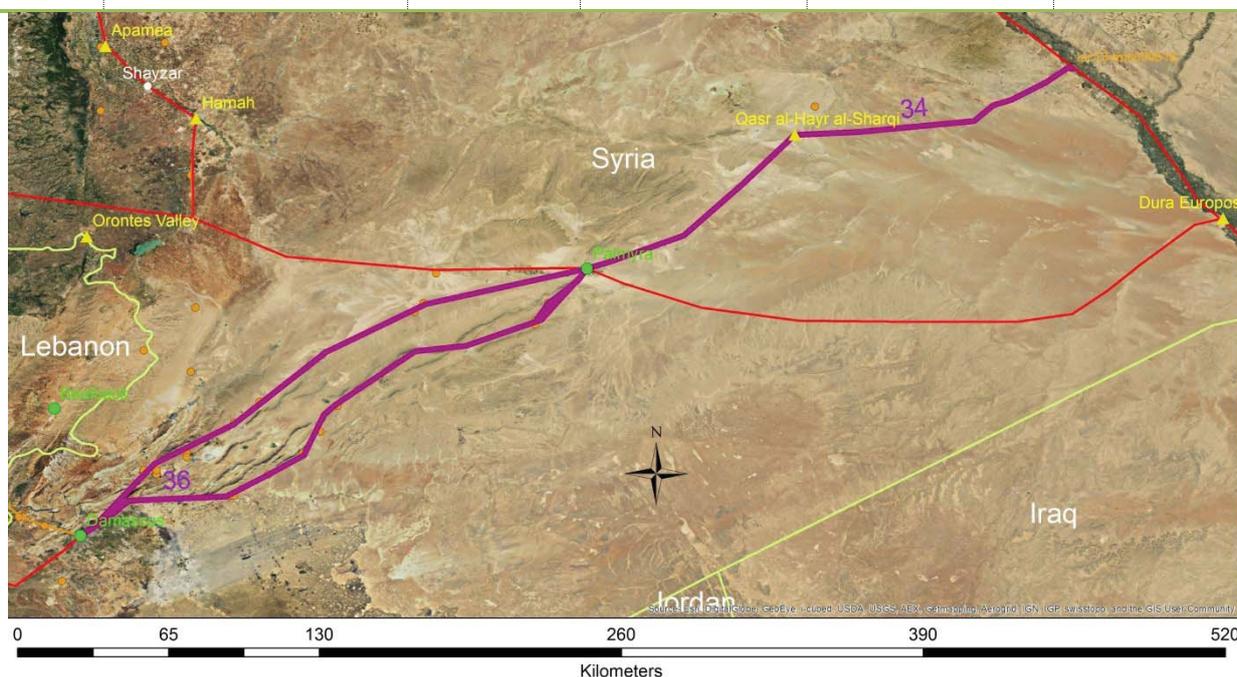
No.	Corridor	Distance (km)	Reason (1) – eco-geographic	Reason (2) - cultural	State Parties
27/54	The Silk Roads: crossing the northern Iranian plateau	1,100	Fertile piedmont zone amongst the foothills of the Alborz mountains and arid Northern Iranian plateau.	Characterised by well managed irrigation systems to support this strategic and heavily used route.	Afghanistan, Iran



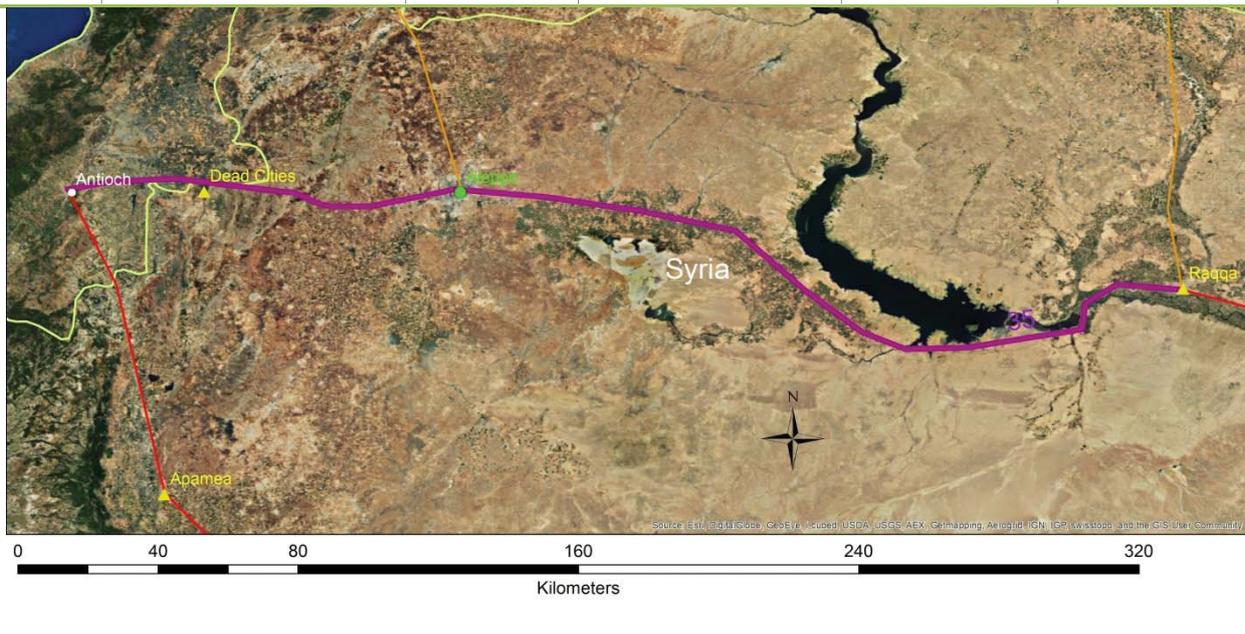
No.	Corridor	Distance (km)	Reason (1) – eco-geographic	Reason (2) - cultural	State Parties
30	The Silk Roads: through the mountains and down to the Tigris/Euphrates – Ray to Baghdad	732	Temperate mountains punctuated by the wide valleys, down to fertile zone east of the Euphrates.	Important trans-Zargos route – heavily used over time. Substantial and prolonged urban development. Major political and administrative centres.	Iran & Iraq



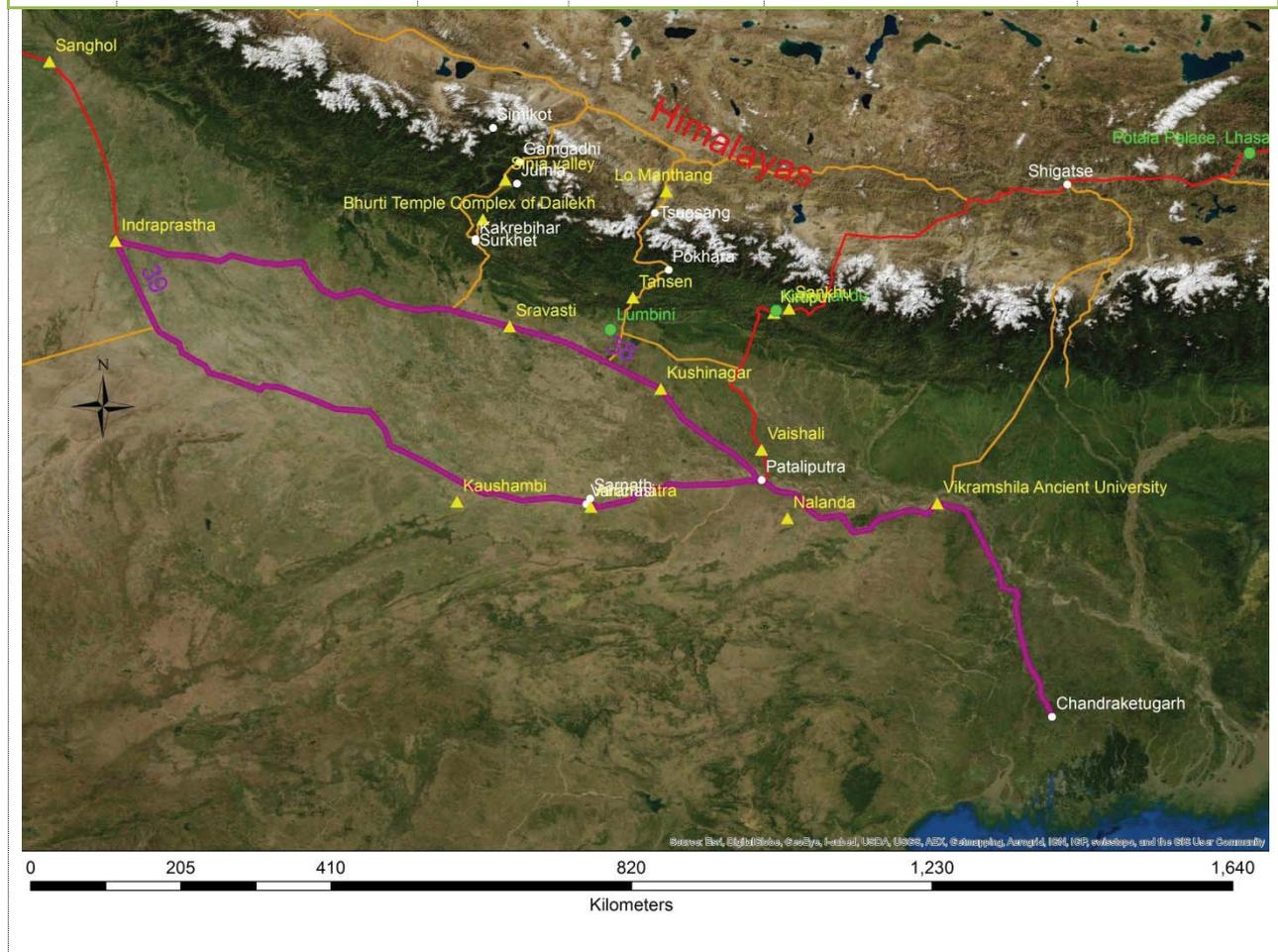
No.	Corridor	Distance (km)	Reason (1) – eco-geographic	Reason (2) - cultural	State Parties
34/36	<p>The Silk Roads: crossing the desert – Euphrates to Palmyra and Damascus</p> <p>Case for two corridors between Palmyra and Damascus, perhaps reflecting chronological variations</p>	428	Desert route.	Complex array of caravanserais and routes. Outstanding examples of way-stations and irrigation/water supply.	Syria



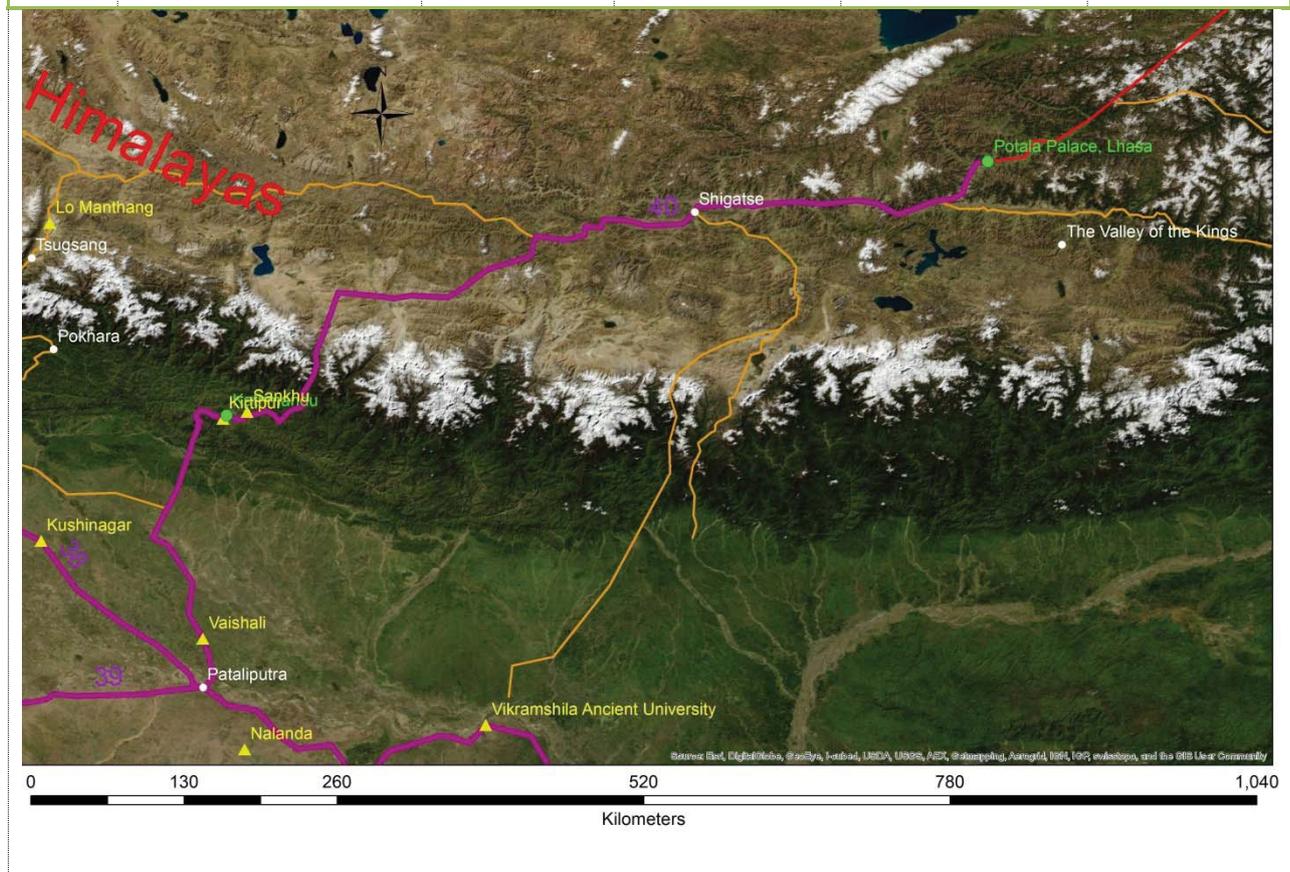
No.	Corridor	Distance (km)	Reason (1) – eco-geographic	Reason (2) - cultural	State Parties
35	The Silk Roads: upper Euphrates to the Mediterranean - Raqqa to Antioch	280	Eastern portion follows the major Euphrates river; western section crosses fertile plains and well irrigated broad valleys.	Vital route over long period of time, leading to some major cities and large areas of agricultural production.	Syria & Turkey



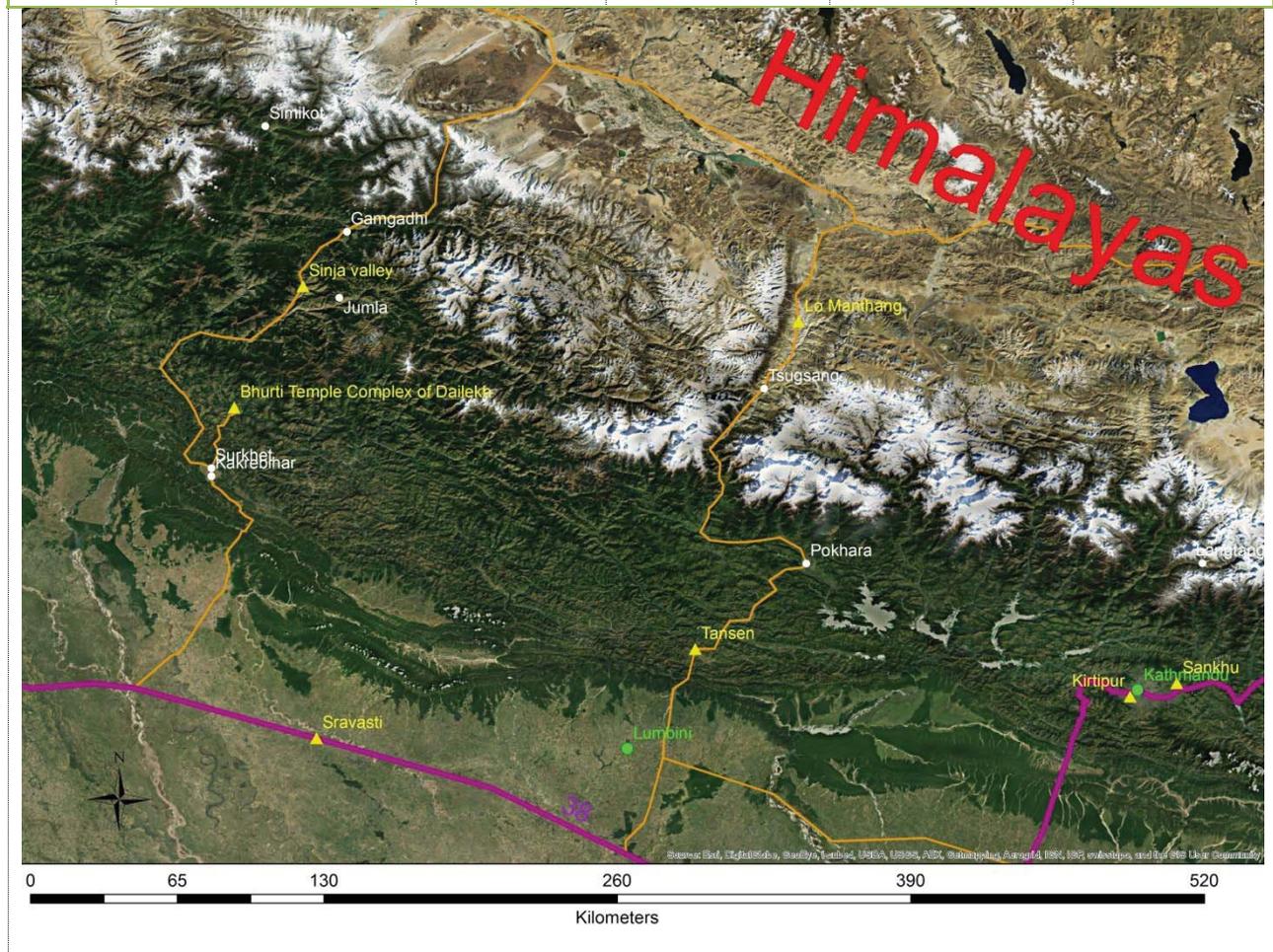
No.	Corridor	Distance (km)	Reason (1) – eco-geographic	Reason (2) - cultural	State Parties
38 & 39	<p>The Silk Roads: down the Ganges - Indraprastha to Chandraketugarh</p> <p><i>There is a good case for a much wider corridor to encompass 38 & 39, and potential a variety of other routes/sites through this broad fertile zone.</i></p> <p><i>Could also be expanded to enable trans-boundary working with Bangladesh.</i></p>	1,392	<p>Fertile river system with wide agriculturally productive zone.</p> <p>Important for connections to northern mountain routes and eastward to the sea.</p>	<p>Issues of water management, and the role in this of monastic communities. Major developments in urbanism, sites of learning and religious development/architecture. Major power base for a variety of empire systems.</p>	India



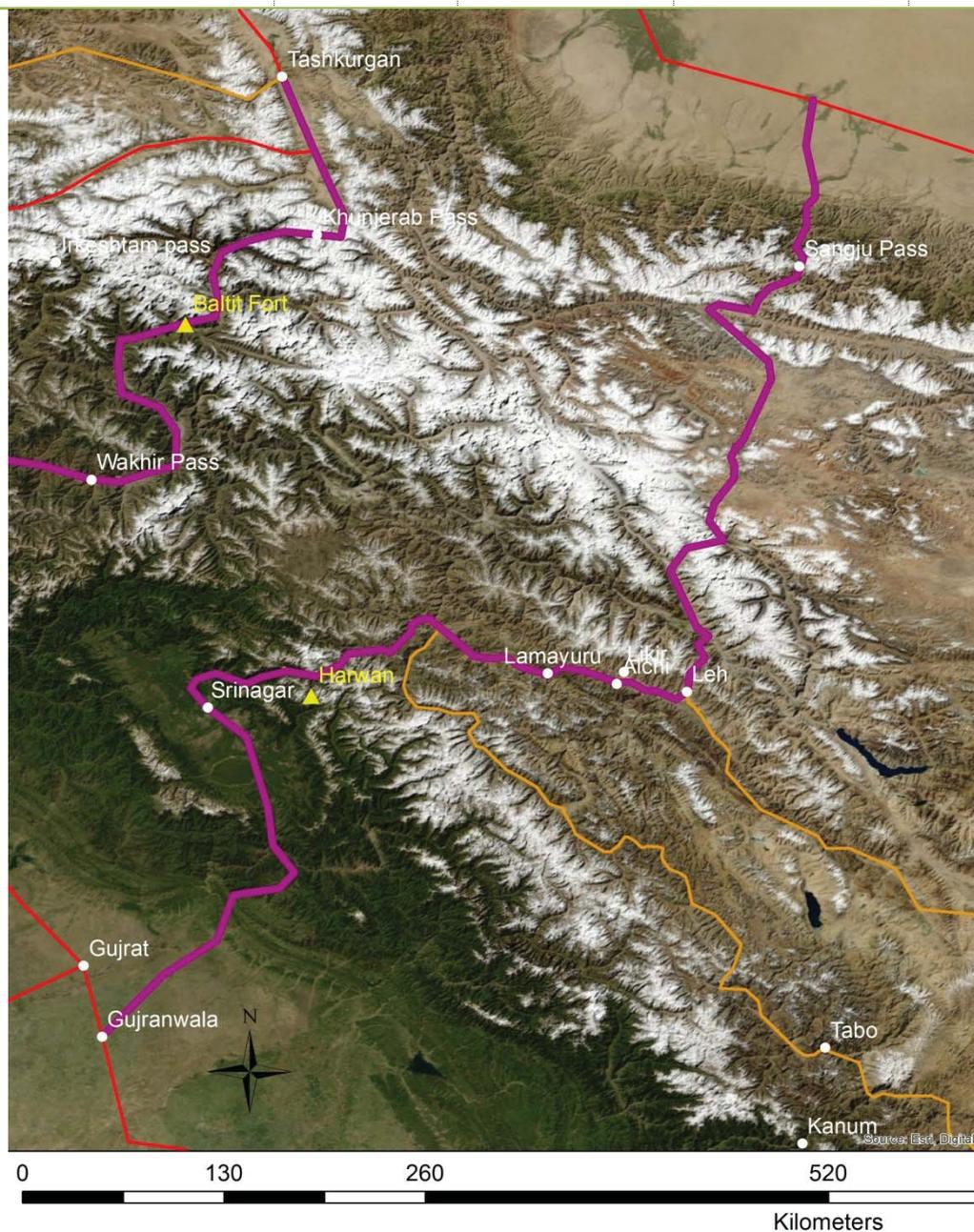
No.	Corridor	Distance (km)	Reason (1) – eco-geographic	Reason (2) - cultural	State Parties
40 (part)	<p>The Silk Roads: the high Tibetan plateau and down to the Ganges – Lhasa to Pataliputra</p> <p><i>Complex route and options which elements in India to include.</i></p>	980	The high plateau adaptation, major valley systems through the Himalayas, and down into the fertile Ganges delta.	Complex empire systems with periods of isolation and periods of major connectivity; local adaptations to climate and major religious and urban outcomes.	China, Nepal & India



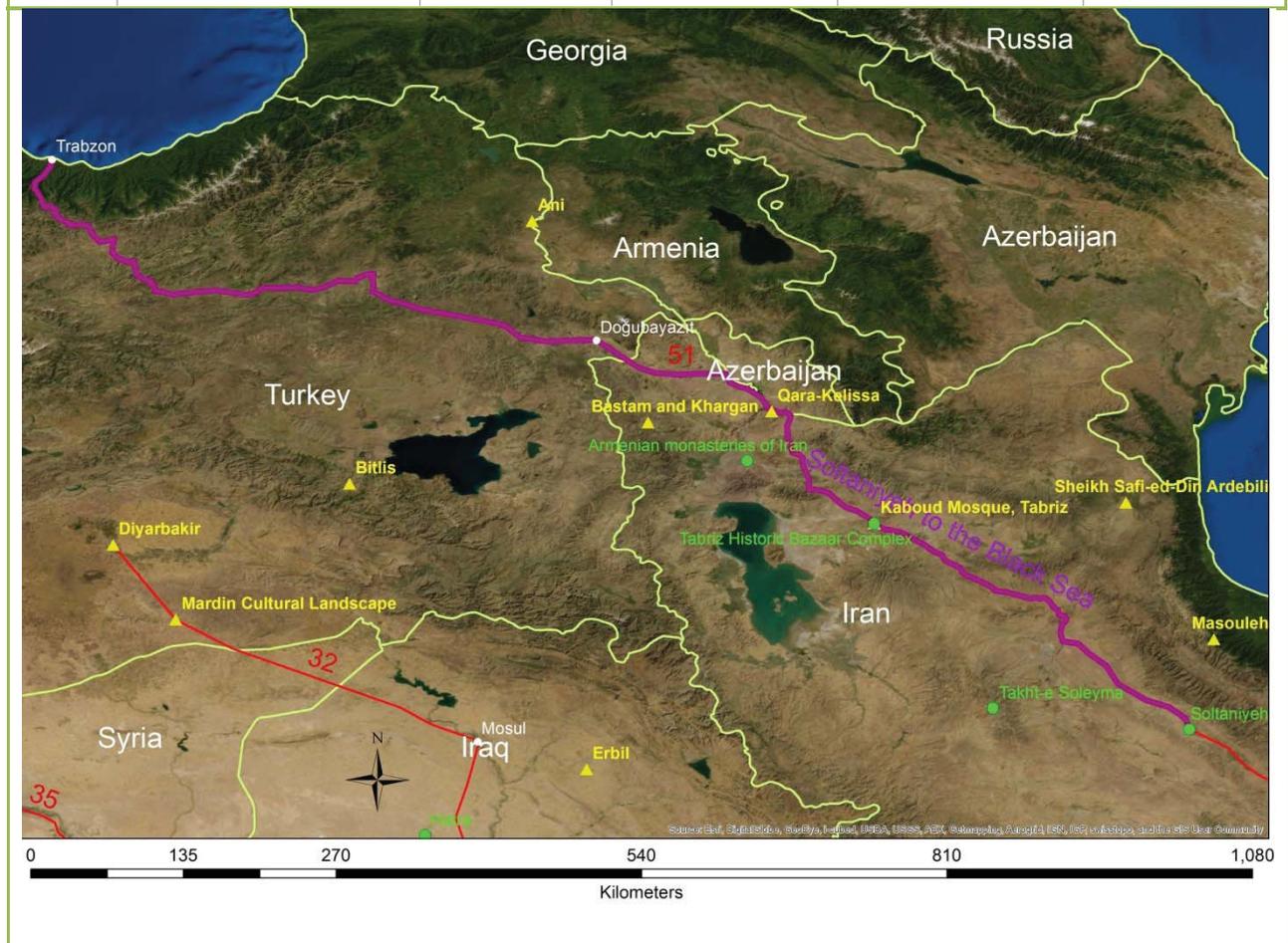
No.	Corridor	Distance (km)	Reason (1) – eco-geographic	Reason (2) - cultural	State Parties
41 & 42	<p>The Silk Roads: valleys and mountains (central and western Nepal) - Lo Manthang and Surkhet to the Ganges</p> <p>Two routes but perhaps best combined as representing similar issues of adaption. Could be extended up on Tibetan plateau.</p>	357 & 389	High Himalayan mountain passes, steep small trails and fertile high valleys.	Crucial adaptation of small routes; pillar stone markers, forts and way-stations, along with blend on Hindu & Buddhist temples & iconography.	China?, Nepal & India



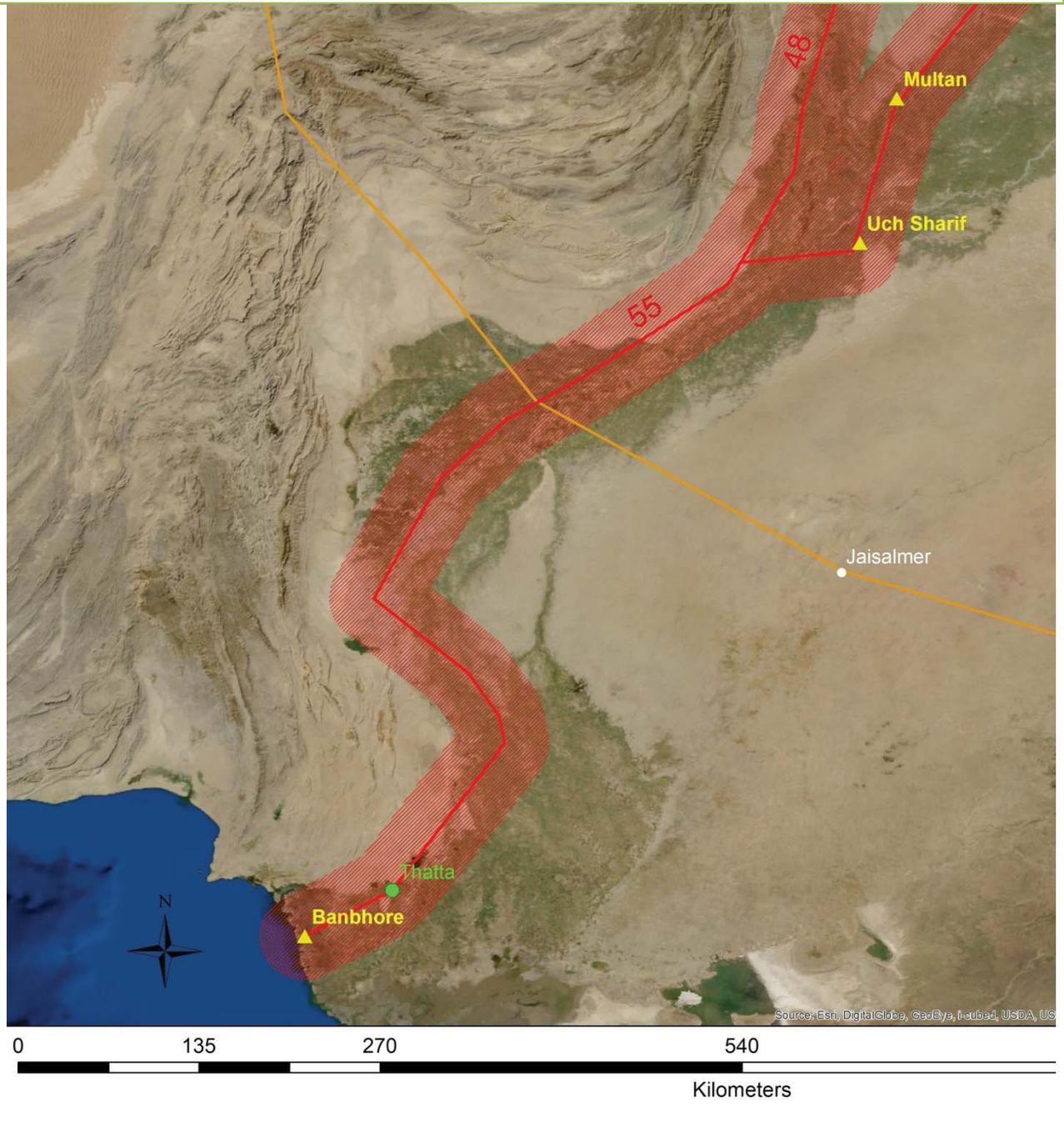
No.	Corridor	Distance (km)	Reason (1) – eco-geographic	Reason (2) - cultural	State Parties
43	The Silk Roads: through the high Karakoram – Srinagar, Leh and Sangju Pass	1,014	Winding mountain routes with significant climatic and seasonal issues of adaptation.	Complex adaptation to harsh condition, producing unique architecture, cultural contacts and empire/political controls.	China & India



No.	Corridor	Distance (km)	Reason (1) – eco-geographic	Reason (2) - cultural	State Parties
51	The Silk Roads: Soltaniyeh to the Black Sea	1,051	Complex mountain and valley routes	Import connection between Black Sea and the heart of Asia. Major historic port, caravanserai and monastic sites.	Iran & Turkey



No.	Corridor	Distance (km)	Reason (1) – eco-geographic	Reason (2) - cultural	State Parties
55 (part)	The Silk Roads: down the Indus Valley – Multan to Banbhore	886		Strategic route down to the coast, linking with early maritime connections.	Pakistan



4 Database & GIS

4.1 Introduction

The Silk Roads data set developed to support this Thematic Study is not a single integrated one, but a link to the various existing data sources. As such it did not intend to replicate what is currently available, but rather to draw attention to these sources and build upon them.

There are two elements: a database (see Annex 4.2) and GIS digital graphic database of maps, physical backdrops, routes, site locations, etc. (see Annex 4.3). The two are linked and information from the database can be displayed in the GIS (see Annex 4.3.2).

The elements that have been created by the project, or that are freely available in the public domain, will be made available as digital resources to support this publication (for details see Williams forthcoming a).

4.2 Silk Roads Database

The database to support the GIS system was compiled in Microsoft Access 2012©.

4.2.1 The Sites table

A basic table (*sites*) which contains nearly 600 places at present.

Site selection: the sites included in the database reflect the most significant sites of the Silk Roads, which fall within the chronological and geographic scope of the study, and include:

- All existing World Heritage Sites.
- All Tentative List sites – both those specifically supplied in relation to the Silk Roads project and those put forward by State parties that have yet to compile a specific Silk Roads Tentative List.
- Other key sites – most often major nodal settlements.
- There are many other sites which could be included in such a database, way-stations, caravanserai, smaller towns, forts, etc. – but these are well covered in other datasets drawn upon (e.g. OWTRAD – see Annex 4.3.4.3) and thus this data table has focused on more major sites.

Fields: the table contains basic information on location, status, chronologies, criteria for selection, description, links to web resources, etc. A full list of fields and their definitions is available in the database (view the table in Design view).

Descriptive data: where available, the descriptions are taken from State Party Tentative Lists (marked as TL) or World Heritage Site descriptions on the UNESCO website documents (marked as WHS). These are supplemented by material from a variety of other sources and where substantial blocks of information have been used the sources are provided.

Quality & variability: The quality of the information is currently very variable. The descriptions are fairly rough and would ideally require considerable editing and checking.

They could also be significantly enhanced from a wider range of source material, but that is beyond the scope of the current project.

Co-ordinates: decimal latitude and longitude used to interface with GIS.

4.2.2 Other tables

Tables of data derived from other sources have also been included. These are:

- Afghanistan_Ball (Annex 4.3.4.11)
- Iraq Antiquities Map (Annex 4.3.3.2)
- Siroux caravanserais (Annex 4.3.3.3)
- World Heritage List 2010 – trimmed to just those that fall within the study area (Annex 4.3.4.10)
- Whitfield_1999_world_SR – part of the OWTRAD data set (see Annex 4.3.4.3)
- OWTRAD gazetteer nodes (see Annex 4.3.4.3)
- Stopping places – part of the OWTRAD data set (see Annex 4.3.4.3)
- Country codes – list of country codes
- Stein_ruins – part of the Digital Silk Roads project data set (Annex 4.3.4.2)

4.3 Silk Roads GIS

4.3.1 Introduction

Two primary tools were used for this study: Google Earth™ and Esri ArcGIS 10.2.

The existing data (see section 4.2) came in a variety of formats, most notably files in Keyhole Markup Language (KML), or in a zipped format (KMZ) (both Google Earth formats¹); or as shapefiles or geo-referenced raster images, for use in GIS systems.

Some data sets are best suited, or only available, in one of these formats: for example, the background physical data supplied by ESRI comes in ArcGIS (Annex 4.3.5); whereas the Historical Atlas of Eurasia (Annex 4.3.4.1) is only available in Google Earth. It is possible to convert some KML/KMZ material into ArcGIS, and similarly ArcGIS shapefiles can be exported to KML – but at this stage we have not attempted to do that except for some crucial datasets.

In addition, tabulated information held in the project database has been used to create point data in the GIS (see 4.3.2.1), and routes have been directly digitised (see 4.3.2.2).

For a summary of the platform availability of data see Table 7. Details of each data set are given below.

Data set	ArcGIS	Google Earth
Data drawn from the database or directly digitised		

¹ KML was developed for use with Google Earth, and became an international standard of the Open Geospatial Consortium in 2008 (<http://www.opengeospatial.org/>).

Sites	✓	✗
Routes/corridors	✓	✗
Scanned and digitised data		
Historical Atlas of Central Asia	Partly	✓
Archaeological map of Iraq	✓	✗
Siroux (1949) map of Caravanserai in Iran	✓	Places only
Digital archaeological & historical data		
Historical Atlas Eurasia	Partly	✓
<i>Digital Silk Road project</i>		
Silk Road routes and places	Places only	✓
Aurel Stein expeditions	✗	✓
Innermost Asia – 4 volumes	✗	✓
Serindia – 5 volumes	✗	✓
<i>The Old World Trade Routes Project</i>		
Stopping places	✓	✓
Georeferenced Nodes of Long-Distance Communication Routes	Partly	Partly
Trade Routes 600-1000 CE	✗	✓
The Electronic Atlas of Buddhist Monasteries	✗	✓
ArchAtlas	✗	✓
Silk Roads on Google Maps	✗	✓
Ancient Cities DataBase	✗	✓
Pleiades	✗	✓
Project HESTIA	✗	✓
The threat to world heritage in Iraq	✗	✓

World Heritage List 2010	x	✓
Physical data	✓	x
Environmental data	✓	x
Satellite imagery	x	✓

Table 7. Summary of data available in ArcGIS, ArcExplorer and Google Earth formats

4.3.2 Data drawn from the database or directly digitised

4.3.2.1 Sites

This data is represented geo-spatially by drawing data from queries run on the Microsoft Access© database. It includes sites on a **Tentative List**, existing **World Heritage Sites** and **other sites of interest**, which are displayed using information directly derived from a query of the database (Figure 23).

Layer	Description	Query
WH sites	Existing World Heritage Sites	[UNESCOWHS] =True AND [UNESCO_REVIEW_SITE] =True
TL Sites	Tentative List sites	[UNESCO_TL] =True AND [UNESCO_REVIEW_SITE] =True
Sites	All other sites in the database	[UNESCO_REVIEW_SITE] =True AND [UNESCO_TL] =False AND [UNESCOWHS] =False

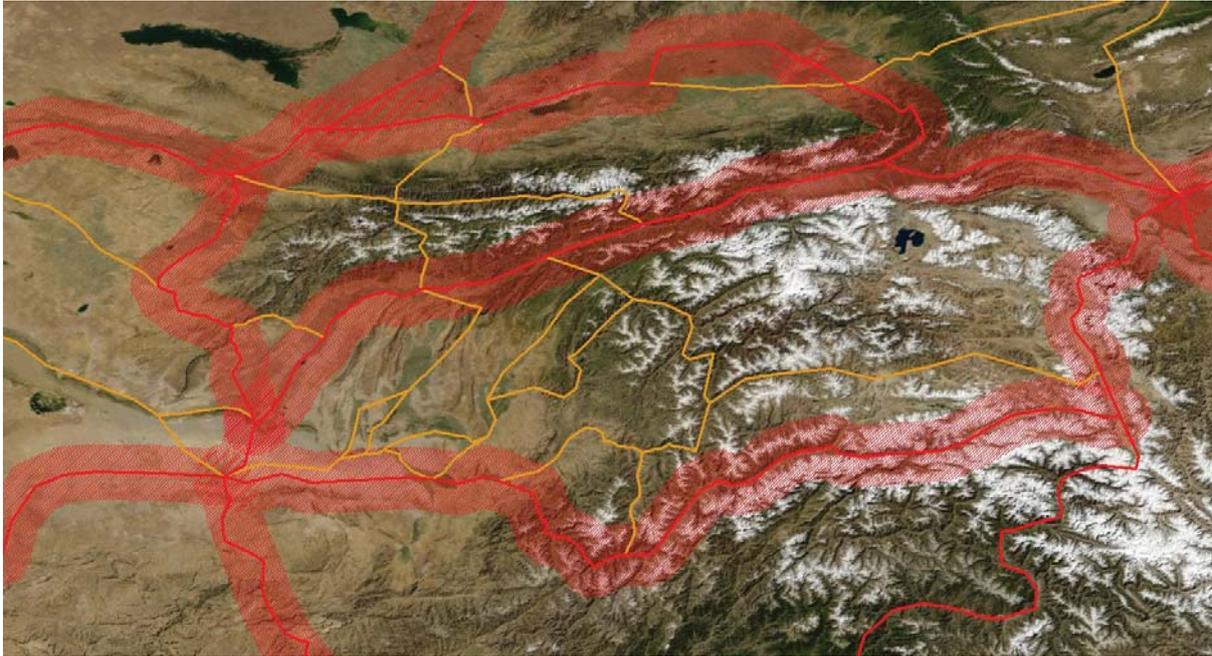


Figure 25. Example of corridors: main routes buffered (red hatching extending 30 km either side of the route).

4.3.3 Scanned and digitised data

Some maps from conventional publications were scanned and information from them digitised, to enable comparison with routes and sites along the Silk Roads. Some of this material is included in the data distributed with the project, but some, such as the Bregel maps, are copyright protected and were only used for internal project analysis.

4.3.3.1 *Historical Atlas of Central Asia (Bregel 2003)*

The following maps from this publication were scanned and geo-rectified:

- Geographic background (1_geography.jpg)
- Parthians and Kushans: 1st century BCE-2nd century CE (2_Parthians and Kushans 1CBC-2CAD.jpg)
- 3rd-6th century CE (3_3-6C.jpg)
- 10th century CE (4_10C.jpg)

However, these cannot be distributed as they are covered by copyright.

4.3.3.2 *Archaeological map of Iraq*

Source: *The archaeological map of Iraq*. Muḍirīyat al-Āthār al-Qadīmah al-'Āmmah. Baghdad: Directorate General of Antiquities, 1967. Scale 1:1,500,000.

This map is freely available from “The threat to world heritage in Iraq”:

<http://users.ox.ac.uk/~wolf0126/#major>

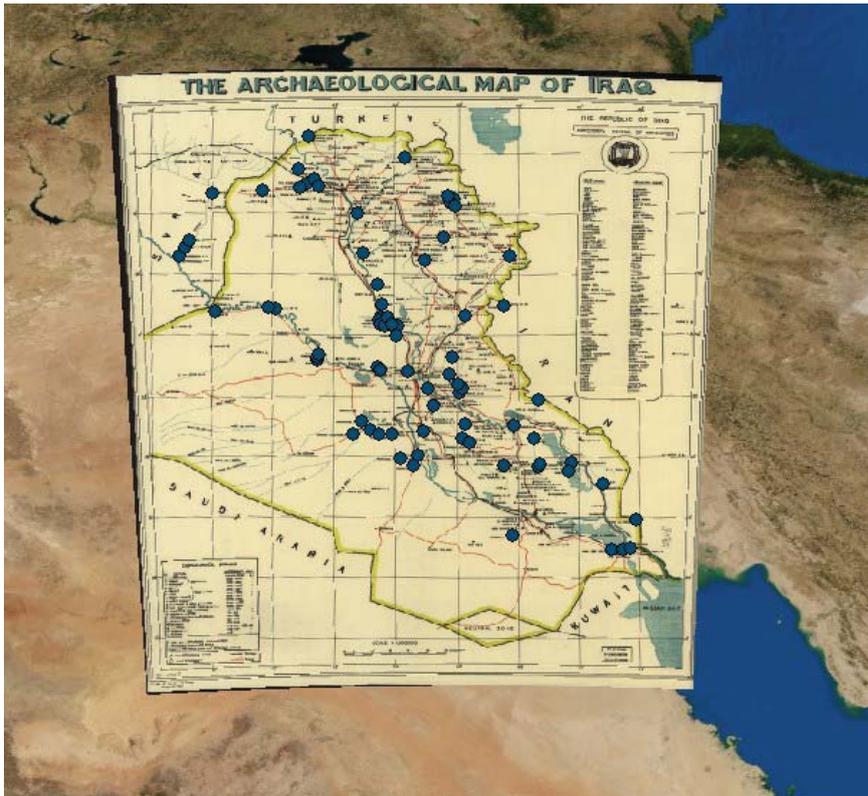


Figure 26. A geo-rectified scan of *The archaeological map of Iraq*, overlain with digitised site locations.

A geo-rectified scan of the map from this publication, and the digitised location of each of the sites, will be made available with the digital data in 2014.

4.3.3.3 *Siroux (1949) map of Caravanserai in Iran*

Source: *Siroux 1949*.



Figure 27. Geo-rectified scan of map from *Siroux 1949*.

A geo-rectified scan of the map from this publication (Figure 27), and the digitised location of each of the sites and routes, will be made available with the digital data in 2014.

In addition, the GIS group *Siroux Iranian Caravanserai* contains the digitised locations (and names) of each of the caravanserai (*Siroux_caravanserai*) and the routes (*Siroux_routes*) (see Figure 28).

In Google Earth only the site locations and names are available.

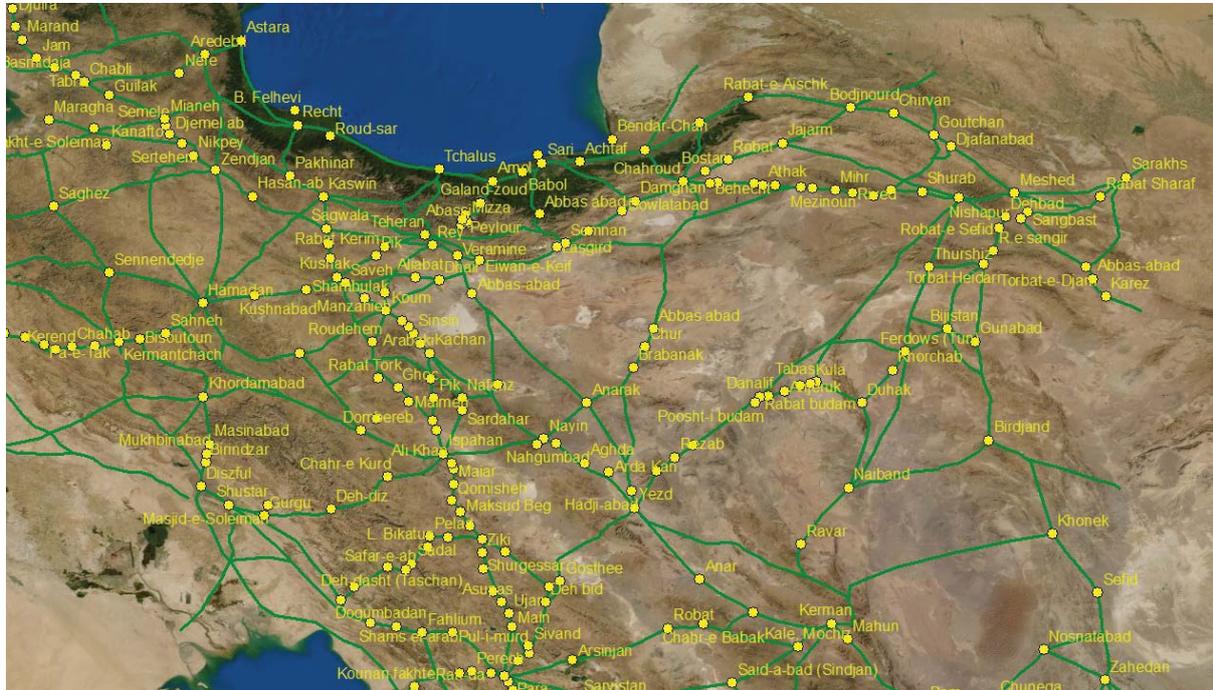


Figure 28. Example of Siroux digitised caravanserai locations (named) and routes.

4.3.4 Digital archaeological & historical data

4.3.4.1 *Historical Atlas of Eurasia Online*

Historical Atlas of Eurasia (Third Edition) is an online atlas available at:

<http://bbs.keyhole.com/ubb/ubbthreads.php?ubb=showflat&Number=1060464>

It is organized into five independent parts, each with a complex array of data, including the spread of Empires, routes and the location of archaeological sites through time. The most relevant parts are:

- Part 2: ‘The Spread of Religion’, including the Silk Roads;
- Part 3: ‘The Great Eurasian Empires’;
- Part 4: ‘Asia Ante Portas’, including the Hun, Mongol, and Timurid Empires;
- Part 5: ‘The Explorers’, including the routes of early Chinese and European Travellers.

It is available in Google Earth (through the historical atlas 2010.kmz file).

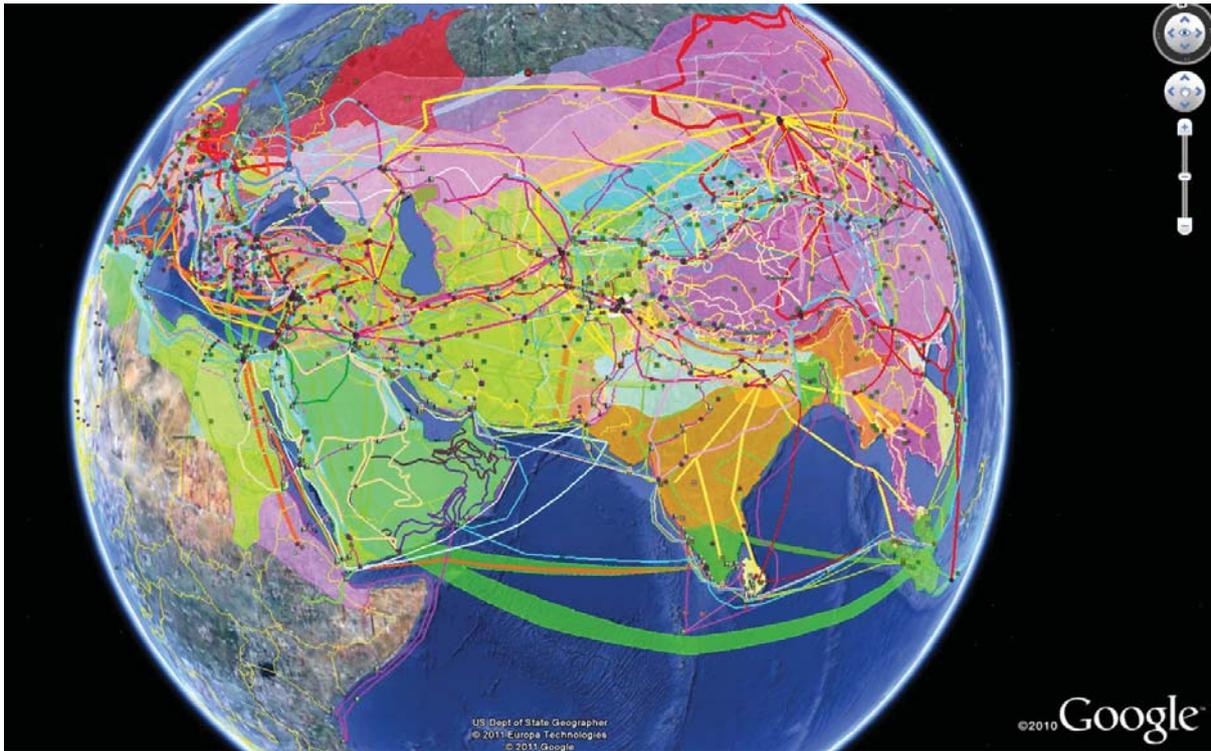


Figure 29. The multiplicity of information available in the Google Earth version of the Historical Atlas of Eurasia.

Some of the Google Earth data has been translated into shape files for viewing in ArcGIS. These include the **Silk Roads routes** (\Silk Roads\GIS\Google Earth\Historical Atlas Eurasia\Eurasia_SR_Map.shp - see Figure 30) and **Eurasian Empires** (\Silk Roads\GIS\Google Earth\Historical Atlas Eurasia\Shapefiles\Eurasian_Empires.shp – see Figure 31).

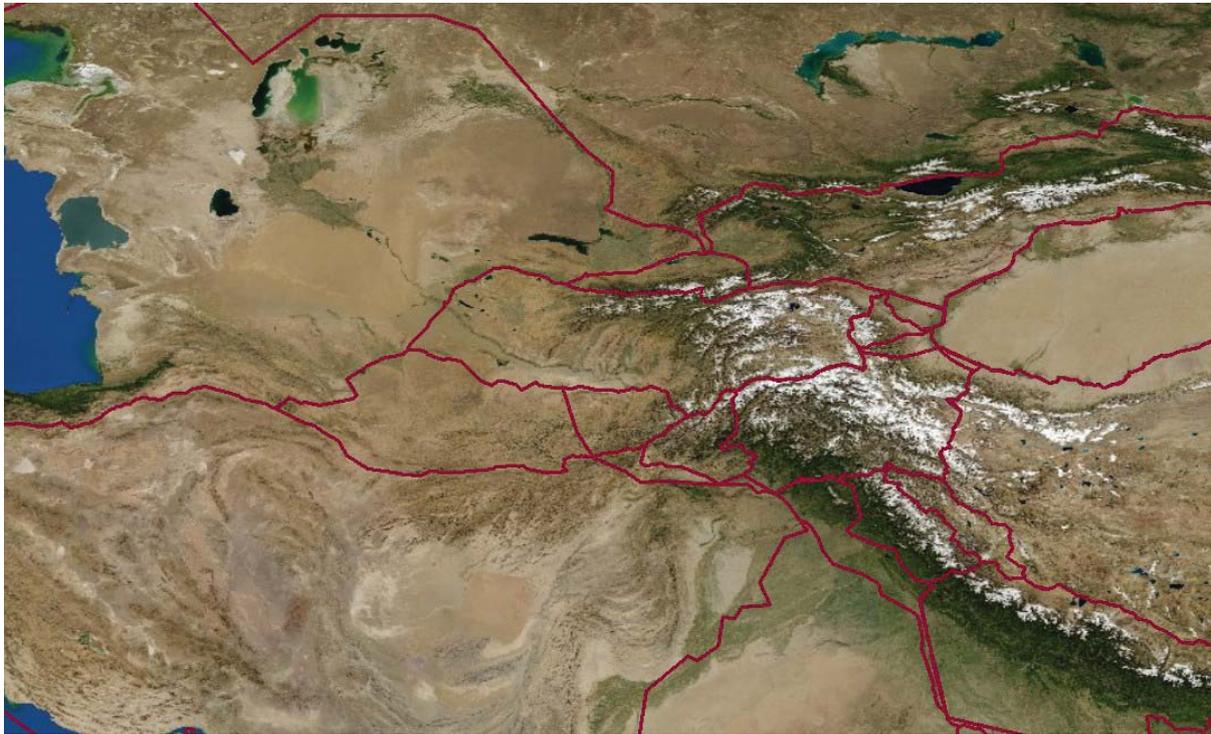


Figure 30. Example of the Historical Atlas of Eurasia ‘Silk Roads routes’ as a GIS shapefile.

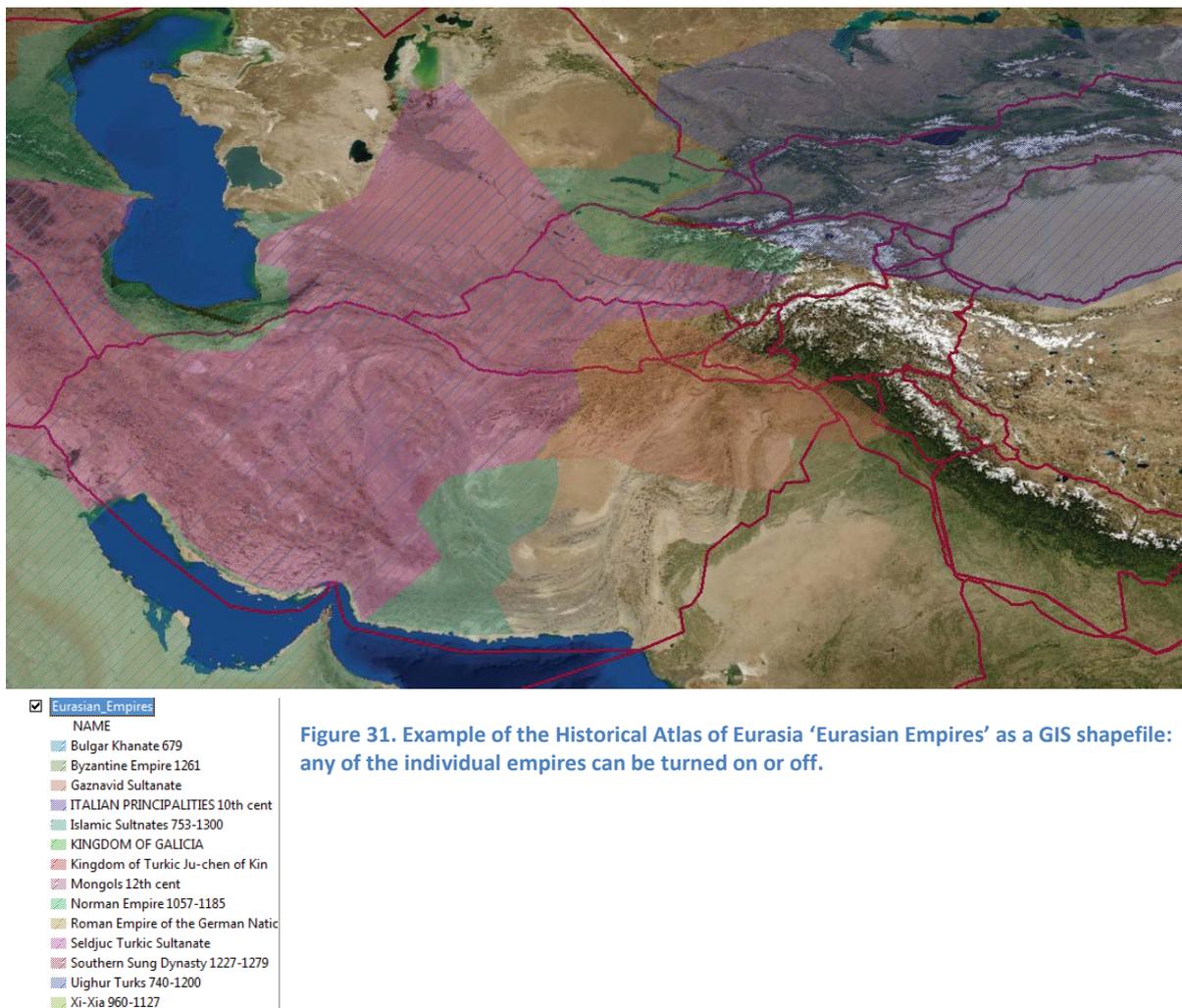


Figure 31. Example of the Historical Atlas of Eurasia ‘Eurasian Empires’ as a GIS shapefile: any of the individual empires can be turned on or off.

4.3.4.2 Digital Silk Roads Project

The Digital Silk roads project is a research project on creating digital archives of cultural heritage through collaboration between informatics and humanities at the National Institute of Informatics in Tokyo, Japan, and linked to the Digital Archive of Toyo Bunko Rare Books. It is available from <http://dsr.nii.ac.jp>. It comprises scans and data from a number of rare or out-of print books, such as the database of Stein place names, and includes numerous individual locations, 196 mountain passes and 189 ruins.

This is largely available only in *Google Earth*:

- **Silk Road routes and places:** site locations and routes in *Silk Roads Places and Routes - Digital Silk Road Project.kmz* (in ArcGIS places only available in *SR_places.shp*).
- **Aurel Stein expeditions:** places, scanned maps of his expeditions, routes, etc – all in *Stein expeditions.kmz* (one table of ‘ruins’ in database and accessible via ArcGIS).
- **Innermost Asia – 4 volumes:** Scanned and geo-rectified maps available in *Innermost Asia (T-VIII-5-A-a-3V-4) Maps - Digital Silk Road.kmz* (see Figure 32 & Figure 33).



Figure 32. Coverage of Innermost Asia maps (from the Digital Silk Roads project) in Google Earth.

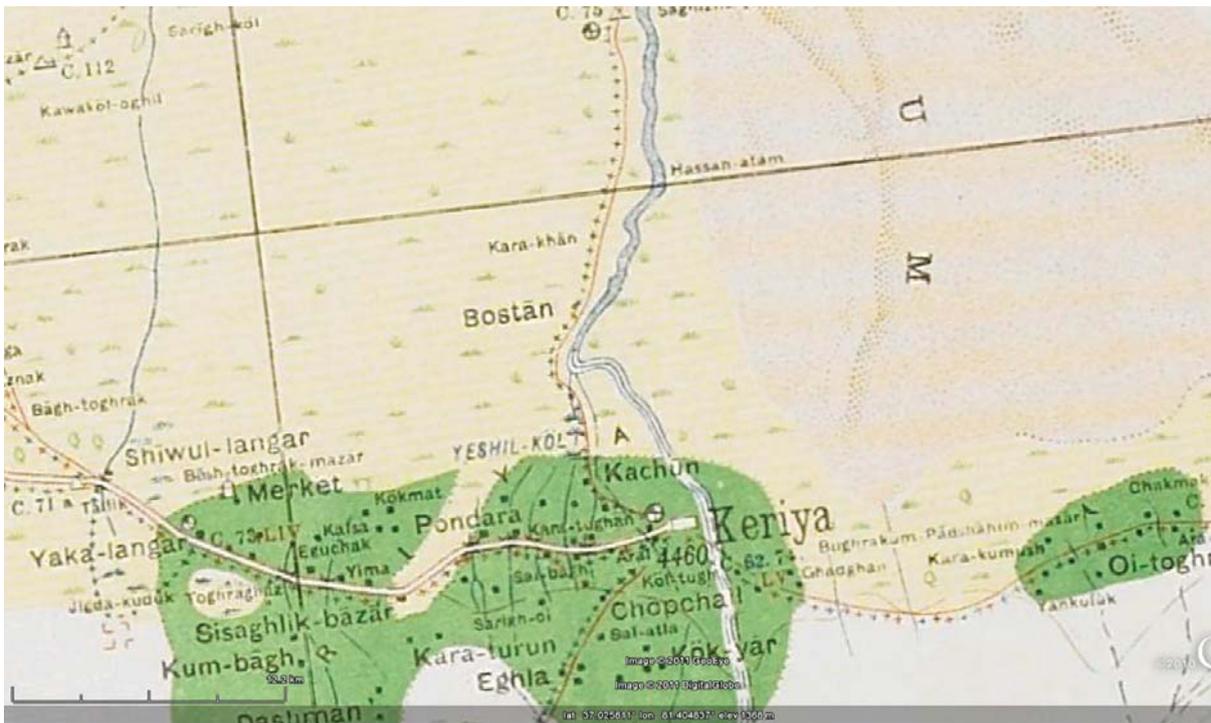


Figure 33. Detail of Innermost Asia maps (from the Digital Silk Roads project) in Google Earth

- ***Serindia – 5 volumes***: Scanned and geo-rectified maps available in *Serindia (VIII-5-B2-9V-5) Maps - Digital Silk Road.kmz* (see Figure 34 & Figure 35).



Figure 34. Coverage of Serinda maps (from the Digital Silk Roads project) in Google Earth.

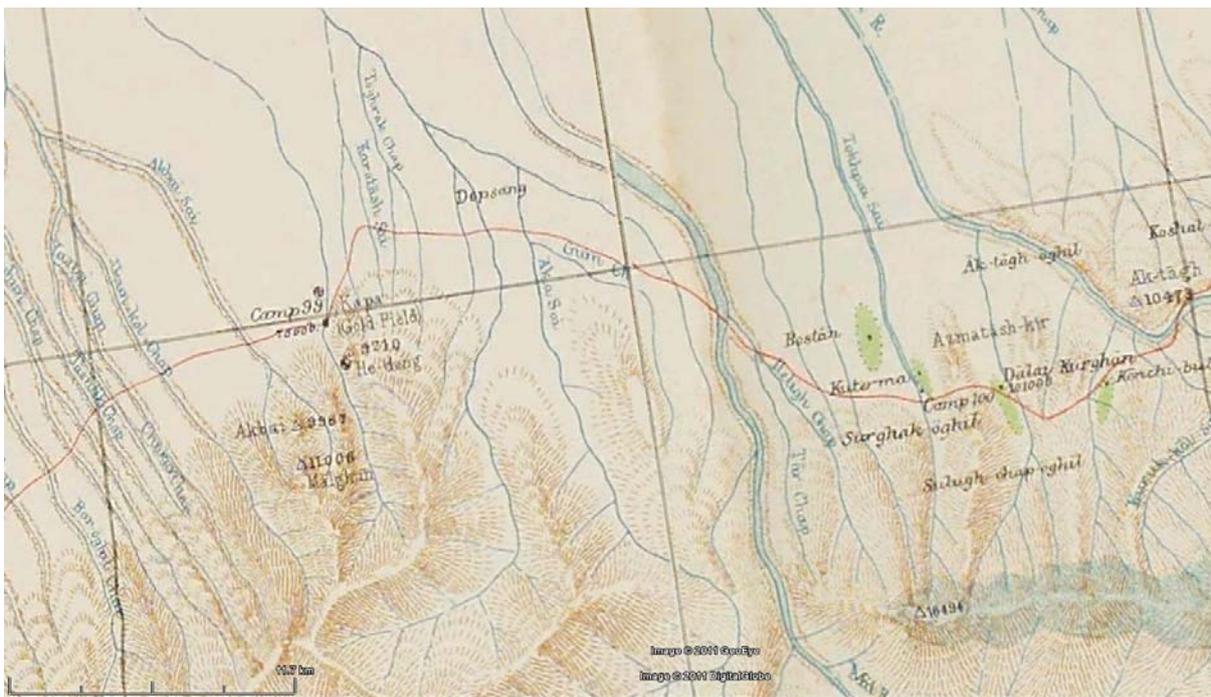


Figure 35. Detail of Serinda maps (from the Digital Silk Roads project) in Google Earth.

4.3.4.3 The Old World Trade Routes Project

Developed by Dr T. Matthew Ciolek (Research School of Pacific and Asian Studies, Australian National University, Canberra, Australia) this incredibly rich data includes point data for specific sites and suggested routes. It is available at <http://www.ciolek.com/owtrad.html>

The data is primarily available as downloadable files (normally CSV format) and as Google Earth KML or KMZ files.

The key elements include:

- **Stopping places: A Catalogue of Georeferenced Caravanserais/Khans** (version 5.0 - Nov 2006). Contains 846 caravanserais/khans, funduks, and other rest houses supporting long-distance communication routes.
- In *Google Earth* these are presented in *Stopping Places.kml*. This contains two earlier kml files: *tmc-nodes-RHSE-data.kml* which covers funduks, hospices, caravansera; *tmc-nodes-HALT-data.kml* which contains other halting places.
- In *ArcGIS* these two are combined into a single shape file *Stoppingplaces.shp*
- **From Afrosiab to Zuchabar: A Gazetteer of Georeferenced Nodes of Long-Distance Communication Routes** (version 10.1 - Jan 2007): contains 16,257 variant place names, of 4,265 different places in Asia, Europe and Africa. A Silk Roads version of this, only including nodes from within the current study area countries (but including Azerbaijan, Armenia, the whole of Turkey, Israel, and Palestine), has 11,524 variant names covering 2,523 separate places. The whole dataset is available in the Microsoft Access© database, which also contains metadata on the fields.

These were used by OWTRAD to create a number of route files (see <http://www.ciolek.com/OWTRAD/DATA/oddda-asia.html>), based around different geographic areas or peoples work (such as Whitfield 1999); the nodes are simply connected by straight lines (Figure 36).

- In *Google Earth* these appear under Nodes: the only ones converted to kml's so far are Tajik1 & 2, Persia, and Bulianov (1999) Turkmenistan & Iran.
- In *ArcGIS* these appear under the group layer *Nodes*. They currently include: NE & Asia - 1400-1600; Asia - 1200-1400; China; Foltz 1999; Kyrgyzstan 1-5; Persia - 550BC-450BC; Tajikistan 1 & 2; Turkmenistan-Iran (Bulianov 1999); Whitfield 1999.

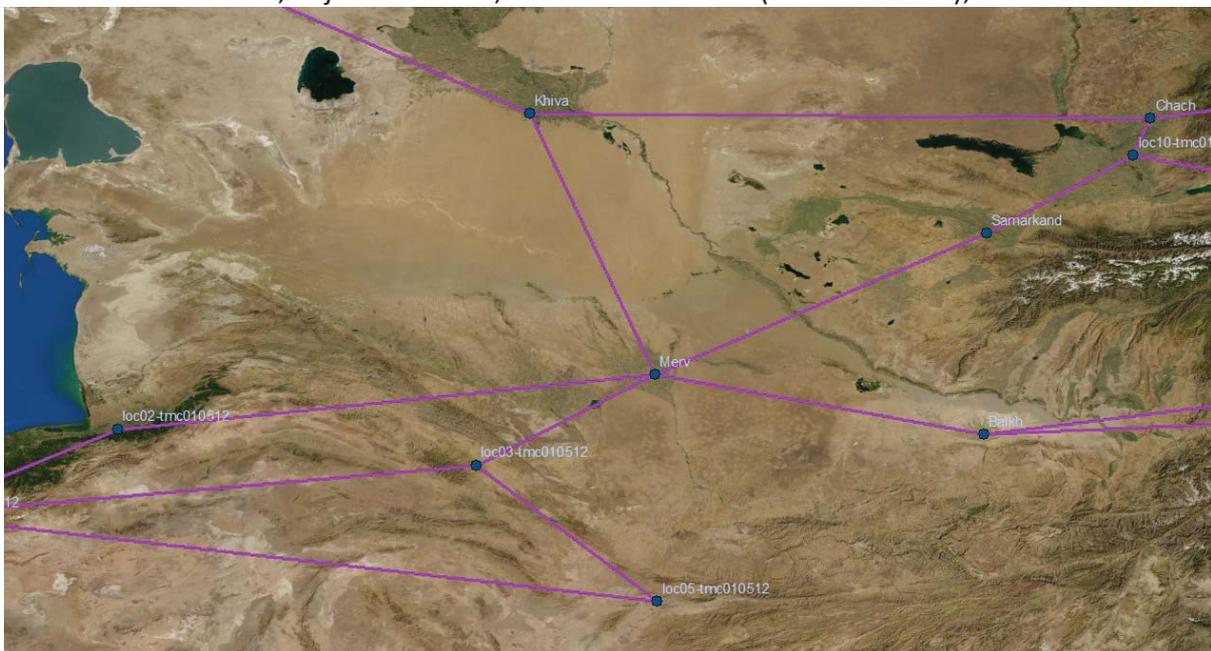


Figure 36. Example of OWTRAD nodes connected by straight lines – in this case from Whitfield 1999.

- Georeferenced historical transport/travel/communication routes and nodes - Old World: a relatively simple set of route segments.

- Only available in *Google Earth*, these are presented in *input-geo-routes.kml*: this creates a group called 'Trade Routes 600-1000 CE', with separate named segments that can be individually turned on/off.
- **The Electronic Atlas of Buddhist Monasteries**: this is a work in progress (<http://www.ciolek.com/GEO-MONASTIC/geo-monasteries-home.html>). Details of communication, contacts and affinities between as many as possible of the Buddhist monasteries and convents known to have operated in South Asia, SE Asia, Central Asia, and East Asia from c 200 CE until c 1200 CE. Fantastic data linked to a very good Wiki site (<http://monastic-asia.wikidot.com/>).
- This data is only currently available in *Google Earth* this data set is represented by a number of geographically defined kml files.



Figure 37. Example of OWTRAD monastic data in Google Earth. Legend - White circles: Clusters and groups of monasteries; Yellow: Theravada monasteries; Green: Sammitiya, Sarvastivada & Mahasanghika monasteries; Red: Mahayana monasteries; Magenta: Vajrayana monasteries; Blue: Indeterminate Buddhist tradition.

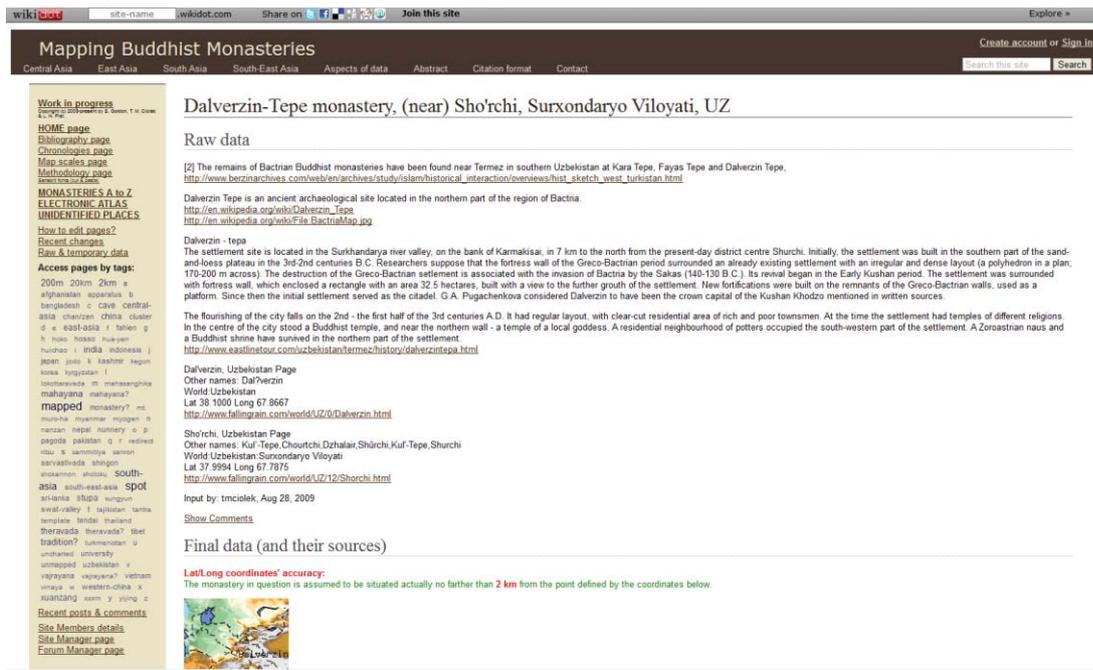


Figure 38. Example of OWTRAD wiki monastic entry.

- **A trade routes' glossary:** architectural, geographical, and historical terms relating to trade, communication, and pilgrimage routes. Version 1.7 (Aug 2009). A very useful thesaurus of terms is available at: <http://www.ciolek.com/OWTRAD/trade-routes-glossary.html>.

4.3.4.4 ArchAtlas

ArchAtlas is a web-orientated archaeological mapping and research project, founded by the late Prof. Andrew Sherratt. It is available at: <http://www.archatlas.org/Home.php>

Data from on-going archaeological mapping projects, across the Near East and Central Asia, are discussed, with an emphasis on the Bronze Age although the site contains material from all periods. It includes a number of thematic on-line essays.

A basic list of sites linked to essays and descriptions is available in *Google Earth* as *ArchAtlasGE2006.kml*.

4.3.4.5 Silk Roads on Google Maps

Consists of a collection of place-markers and routes, in part derived from Digital Silk Roads data (see Annex 4.3.4.2). Available at: <http://bbs.keyhole.com/ubb/download.php?Number=937387>

The data set *552906.kmz* contains routes and places. The alignment of the roads at high resolution are somewhat arbitrary. The towns are mostly named after one of their historical spellings. Some descriptions have been included.

4.3.4.6 Ancient Cities DataBase

The Ancient Cities DataBase contains information about cities and towns that were founded before 400 CE. Data is available for *Google Earth* from: <http://sites.google.com/site/ancientcitiesdb/Home> (*Historical Cities.kmz*).

Data includes: Original Name, Historic Name, Founding Date, Original Nation, and Location, and can be selected by region. The emphasis is upon the classical world and the Mediterranean, but sites from a wide area are covered.

4.3.4.7 Pleiades

Pleiades is a joint project of the Ancient World Mapping Center, the Stoa Consortium, and the Institute for the Study of the Ancient World (<http://pleiades.stoa.org/>).

Pleiades aims to provide a worldwide ability to use, create, and share historical geographic information about the Greek and Roman World in digital form. The project began by digitising the *Barrington Atlas* (Talbert 2000).

The data is only available in Google Earth, and links to online resources/descriptions and maps. It currently contains:

- 32,336 Ancient Locations
- 26,646 Ancient Place Names
- 31,559 Ancient Places
- Vocabularies covering: name-accuracy; association-certainty; place and feature types; attestation-confidence; time periods; name-completeness; ancient-name-languages; name-types.

At present, it has two drawbacks:

- It originally only provided grid square locations, although now there are more sites with specific locations.
- Pleiades has only limited support for multiple toponyms for the same location.

A new Pleiades+ hopes to address these issues.

4.3.4.8 Project HESTIA: the Herodotus Encoded Space-Text-Imaging Archive

HESTIA provides an approach towards conceptions of space in the ancient world. It examines the ways in which space is represented in Herodotus' *History*, in terms of places mentioned and geographic features described. It is accessible from <http://www.open.ac.uk/Arts/hestia/>

KML file (*hestia.kmz*) has an embedded network link which creates an overlay of red squares showing all the locations referred to by Herodotus. When zooming in low, the squares become clickable points that provide information about the location as well as each reference to it (in English and Greek).

4.3.4.9 The threat to world heritage in Iraq

An Oxford University website (<http://users.ox.ac.uk/~wolf0126/>) has three maps of Iraq heritage:

- Upper Euphrates
- Upper Tigris
- Lower Mesopotamia

These have been geo-rectified in *Google Earth* and are available in the group *Iraq at risk*.

4.3.4.10 World Heritage List 2010

The current World Heritage List can be downloaded from <http://whc.unesco.org/en/254> and a Google Earth KML file. It contains locations and links to online descriptions (Figure 39).

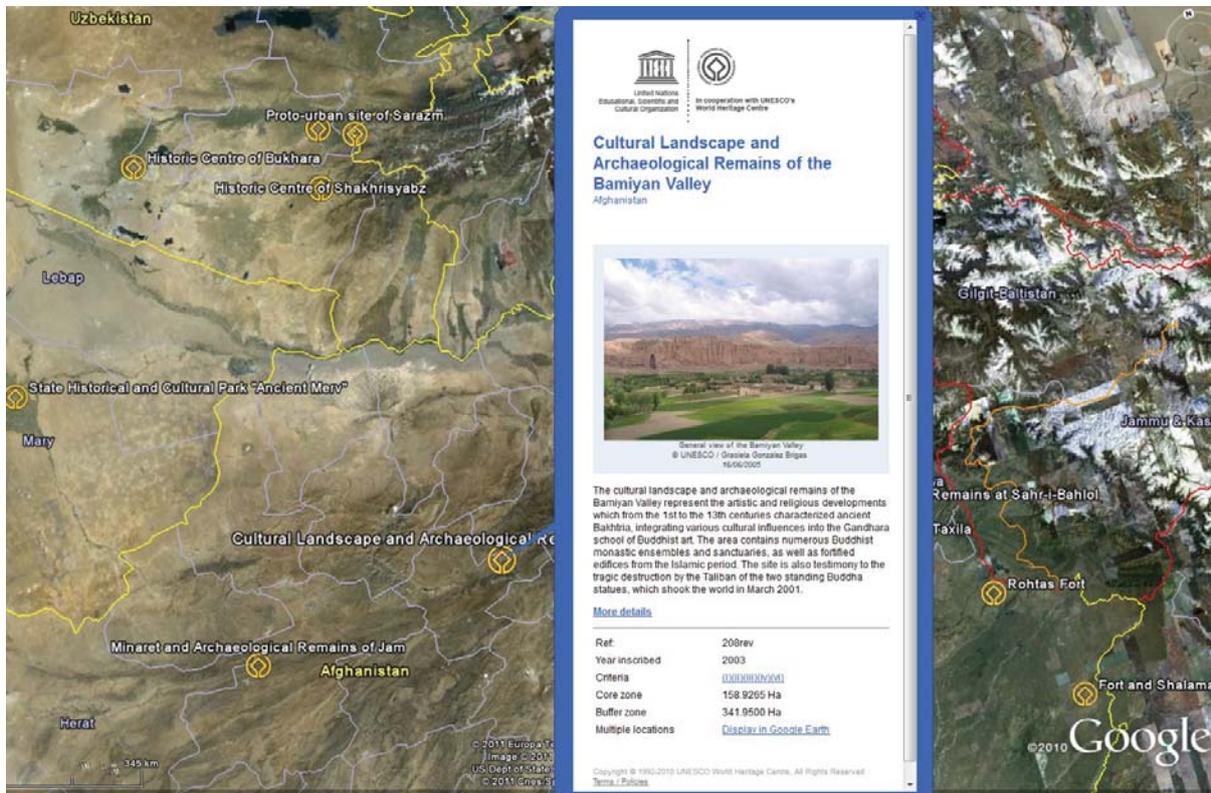


Figure 39. Example of UNESCO World Heritage Sites in Google Earth – with direct link to UNESCO World Heritage Centre information.

4.3.4.11 Ball's Gazetteer of sites in Afghanistan

Warwick Ball's (1982) seminal gazetteer of sites in Afghanistan lists over 1,286 sites in Afghanistan. The spatial data is in geodetic format (degrees and minutes). A digital version of the data in Ball's gazetteer was collated by Rebecca Beardmore, as part of the ArchAtlas project (<http://www.archatlas.org/Home.php>).

- In *Google Earth* this is available as *Af GE sites.kmz*. There are also two sub-sets, covering bridges (*ball_bridges.kmz*) and caravanserai (*ball_caravanserais.kmz*).
- In *ArcGIS* a copy of the data is available inside the Silk Roads database (*Afghanistan_Ball*) and can be viewed through the *ArcGIS* layer *Afghanistan_Ball*.

This map is designed to overlay base maps and thematic maps, such as demographics or land cover, for reference purposes. The reference map includes administrative boundaries, cities, water features, physiographic features, parks, landmarks, highways, roads, railways, and airports on a transparent background. The map was compiled from a variety of best available sources from several data providers, including the U.S. Geological Survey, National Park Service, Tele Atlas, AND, and ESRI. The reference map currently provides coverage for the world down to a scale of ~1:1m and coverage for the continental United States and Hawaii to a scale of ~1:70k.

For more information on this map, visit:

http://goto.arcgisonline.com/maps/Reference/World_Reference_Overlay

4.3.5.3 World Boundaries and Places



Figure 43. World Boundaries and Places on top of World_Physical_Map (see above).

This map presents country, state/province, and county or equivalent boundaries and place names for the world. The map was developed by ESRI using administrative and cities data from ESRI and AND Mapping. This map is designed for use with maps with lighter backgrounds, such as World Shaded Relief (see below).

For more information on this map, visit:

http://goto.arcgisonline.com/maps/Reference/World_Boundaries_and_Places_Alternate

4.3.5.4 World Shaded Relief



Figure 44. World shaded relief.

This map presents a worldwide shaded relief map at approximately 1 kilometre or 90 meters per pixel resolution for the world. The shaded relief map was developed by ESRI using GTOPO30 and Shuttle Radar Topography Mission (SRTM) elevation data from the USGS and National Geospatial-Intelligence Agency (NGA) overlaid with water bodies from Esri and Automotive Navigation Data (AND).

For more information on this map, visit:

[http://goto.arcgisonline.com/maps/World Shaded Relief](http://goto.arcgisonline.com/maps/World%20Shaded%20Relief)

For more information on this map, visit: <http://services.arcgisonline.com/ArcGIS/services>.

4.3.5.5 World Topo Map

This map service is designed to be used as a basemap and as a reference map. The service includes administrative boundaries, cities, water features, physiographic features, parks, landmarks, highways, roads, railways, airports, and buildings overlaid on land cover and shaded relief imagery for added context. This service is the default basemap used in the ArcGIS.com map viewer and ArcGIS Explorer Online.



Figure 45. Example of World Topo Map.

Accessible via: World_Topo_Map.lyr

For more information on this map, visit: <http://services.arcgisonline.com/ArcGIS/services>.

4.3.5.6 World Imagery

Note: This is used as the backdrop for most of the maps produced in the report.



This map presents low-resolution imagery for the world and high-resolution imagery for the United States and other areas around the world. The map includes NASA Blue Marble: Next Generation 500m resolution imagery at small scales (above 1:1,000,000), i-cubed 15m eSAT imagery at medium-to-large scales (down to 1:70,000) for the world, and USGS 15m Landsat imagery for Antarctica. The map features i-cubed Nationwide Prime 1m or better resolution imagery for the contiguous United States, Getmapping 1m resolution imagery for Great Britain, AeroGRID 1m to 2m resolution imagery for several countries in Europe, IGP 1m resolution imagery for Portugal, and GeoEye IKONOS 1m resolution imagery for Hawaii, parts of Alaska, and several hundred metropolitan areas around the world. i-cubed Nationwide Prime is a seamless, colour mosaic of various commercial and government imagery sources,

including Aerials Express 0.3 to 0.6m resolution imagery for metropolitan areas and the best available United States Department of Agriculture (USDA) National Agriculture Imagery Program (NAIP) imagery and enhanced versions of United States Geological Survey (USGS) Digital Ortho Quarter Quad (DOQQ) imagery for other areas.

For more information on this map, visit: http://goto.arcgisonline.com/maps/World_Imagery

4.3.5.7 DeLorme World Base Map

Note: This data requires an internet connection (it is accessed live over the internet – it cannot be downloaded – so you will need a reasonably high-speed internet connection to use this).



Figure 46. DeLorme World basemap.

The map is a seamless global data set with horizontal accuracy of +/- 50 m. The map includes major transportation layers, inland and shoreline hydrography, jurisdiction boundaries and major geographic features. The map has a rich cartographic appearance.

Scale Range: down to 1:288,895.

Coordinate System: Web Mercator Auxiliary Sphere (WKID 102100).

For more information on this map, visit:

http://goto.arcgisonline.com/maps/Specialty/DeLorme_World_Base_Map or

<http://www.delorme.com/digitalmapdata/world.htm>

4.3.6 Physical & environmental data: downloadable

4.3.6.1 World SRTM shaded relief

Downloadable data: SRTM 90m Digital Elevation Data, from the CHIAR Consortium for Spatial Information

Displays shaded relief of the world, between 60 degrees North latitude and 56 degrees South latitude. This data was derived from the Global Digital Elevation Model (SRTM) datasets from the U.S. Geological Survey's EROS Data Center. The resolution is 3 arc seconds (90 meters). The version of the SRTM 3-arc-second data that served as the basis for the SRTM Global Digital Elevation Model data is the Version 2 "finished" data in DTED Level 1 format that was created by NGA by subsampling SRTM 1-arc-second data.

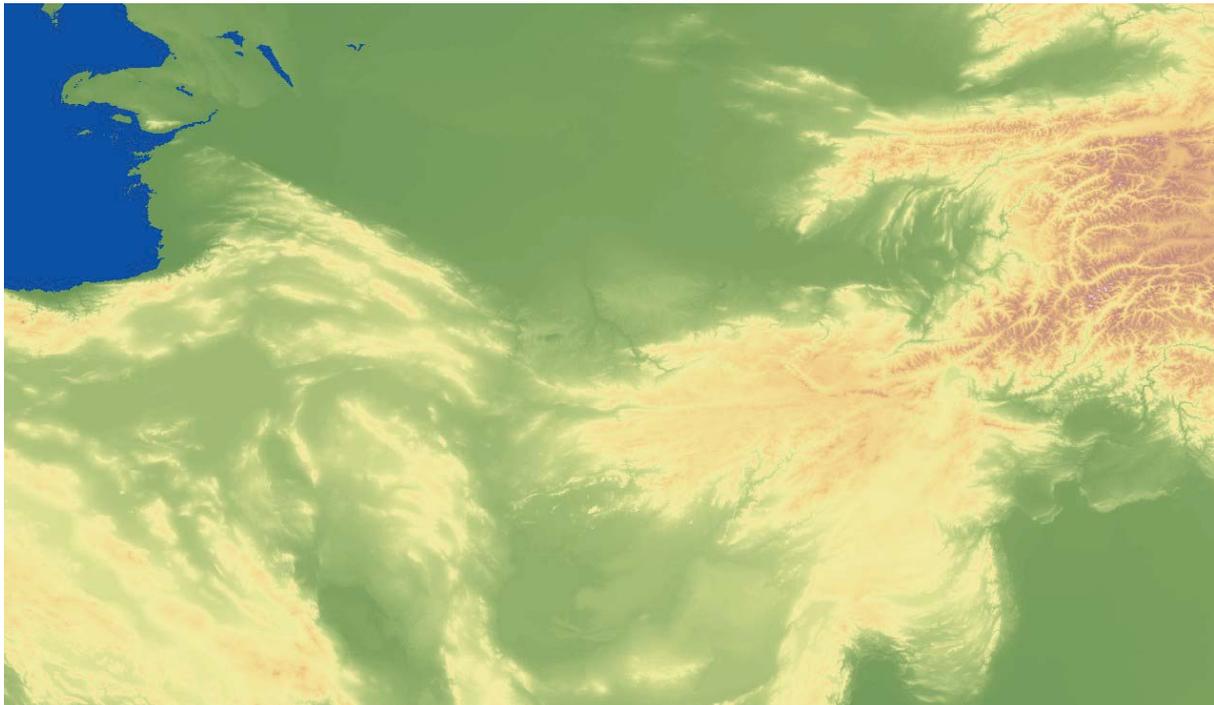


Figure 47. World_SRTM, with gradual colour change representing relief.

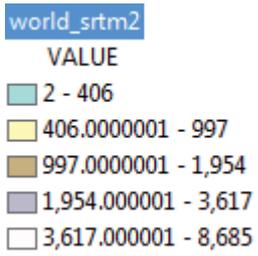
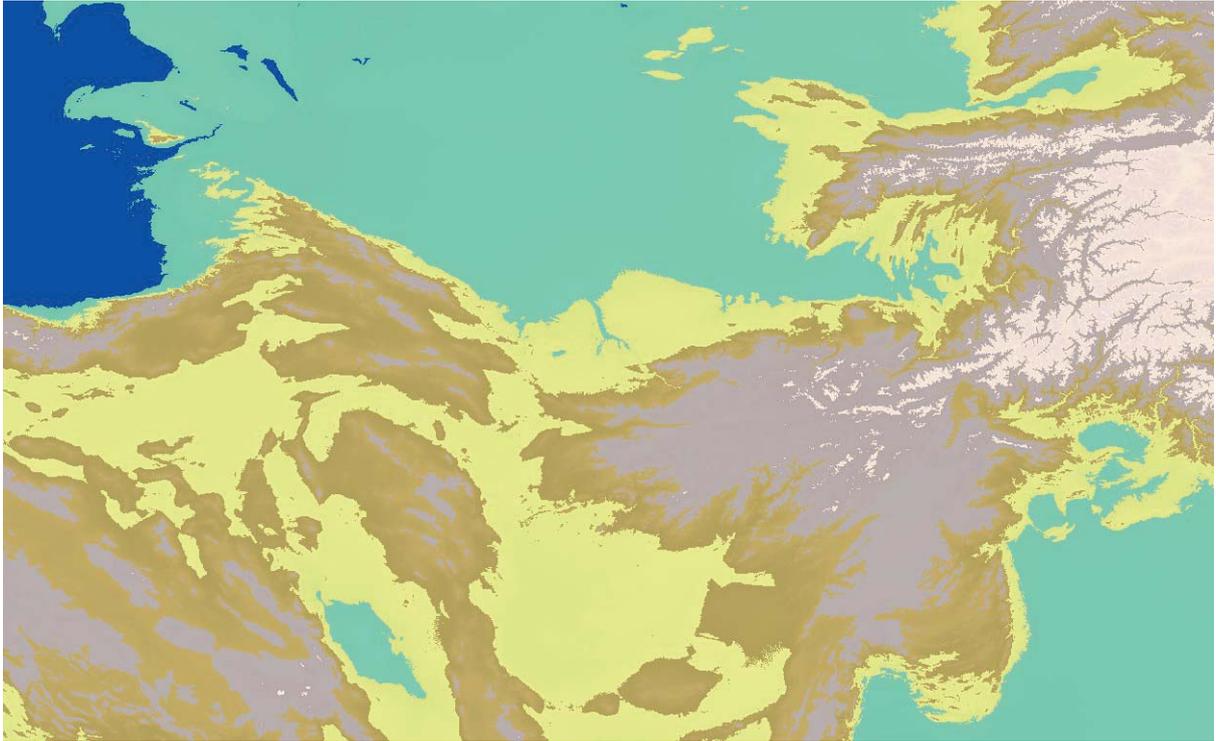


Figure 48. World_SRTM2 has a simplified colour scheme that represents the data in five categories.

4.3.6.2 AS cropland & pasture

Downloadable data:

Raster data in: as_cropland.rrd

Geo tiff data in: as_pasture.tif

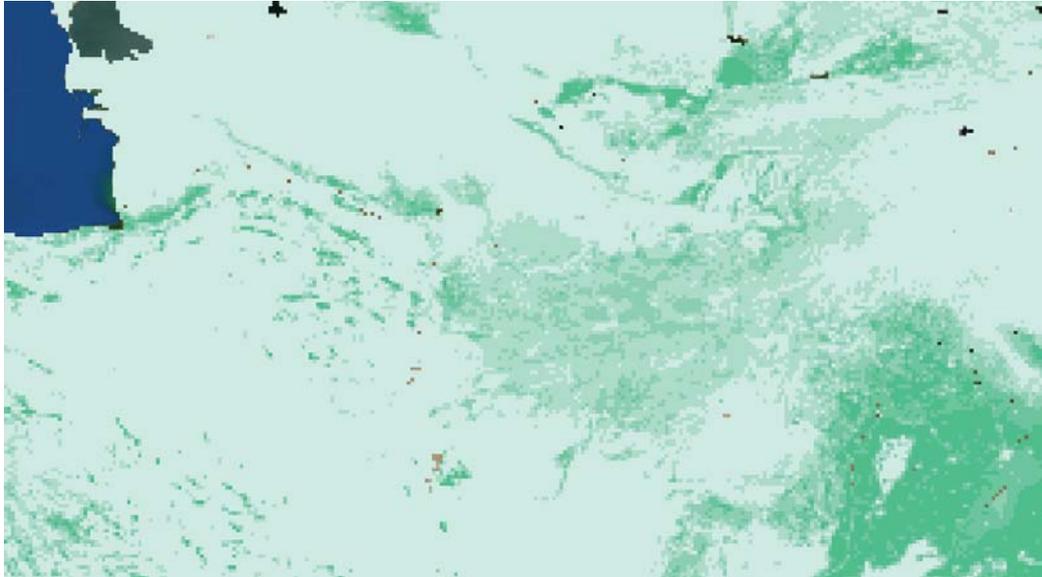


Figure 49. AS cropland

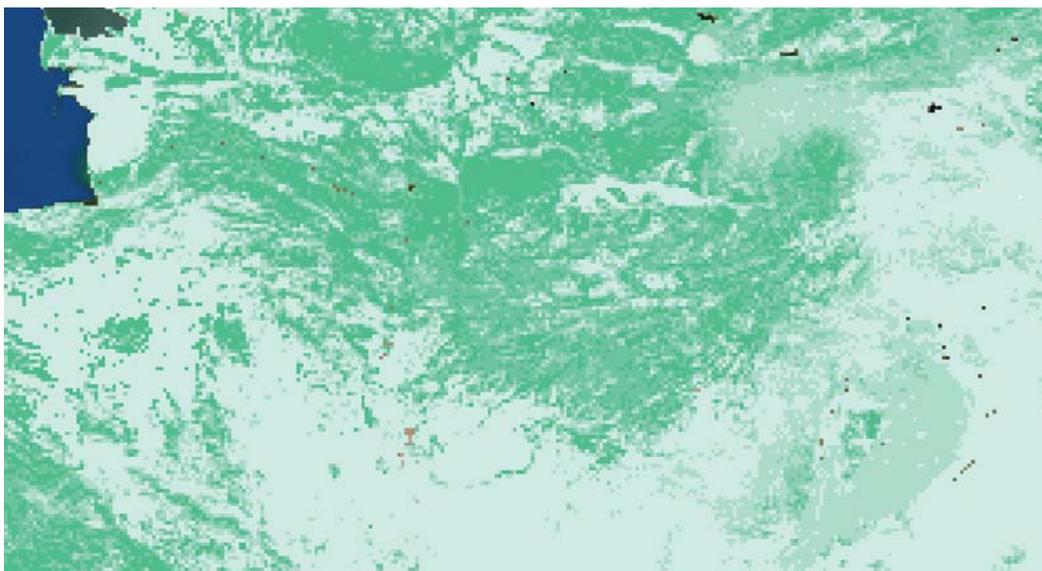
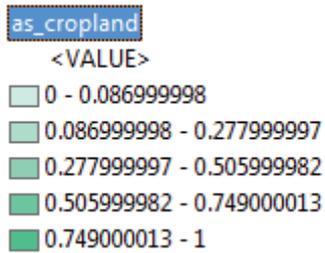
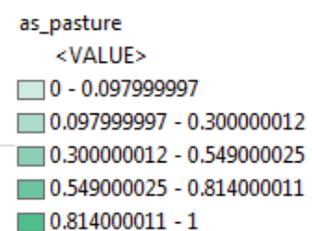


Figure 50. AS pasture.



NASA description: “The Global Croplands dataset represents the proportion of land areas used as cropland (land used for the cultivation of food) in the year 2000. Satellite data from Moderate Resolution Imaging Spectroradiometer (MODIS) and Satellite Pour l'Observation de la Terre (SPOT) Image Vegetation sensor were combined with agricultural inventory data to create a global data set. The visual presentation of this data demonstrates the extent to which human land use for agriculture has changed the Earth and in which areas this change is most intense. The data was compiled by Navin Ramankutty, et. al. (2008) and distributed by the Columbia University Center for International Earth Science Information Network (CIESIN). The global and regional data in Geographic Tagged Image File Format (GeoTIFF) and ESRI GRID formats and maps in Joint Photographic Experts Group (JPEG) and Portable Document Format (PDF) formats are available from the Socioeconomic Data and Applications Center (SEDAC) via direct download at <http://sedac.ciesin.columbia.edu/es/aglands.html>. To provide data on the extent of croplands for research on human-environment interactions.”

The spatial data is provided in raster GeoTiff and ESRI Grid formats. Raster cell sizes are 5", or 0.08333 degree decimal (about 10 km at the equator). The data set is in geographic projection. To download the zip files with accompanying metadata and documentation, click on the links below. The downloaded compressed zipfiles contain raster data, a metadata record, and a readme file.

Data distributed by the NASA Socioeconomic Data and Applications Center (SEDAC): <http://sedac.ciesin.columbia.edu/es/aglands.html> . [Accessed 01 March 2011].

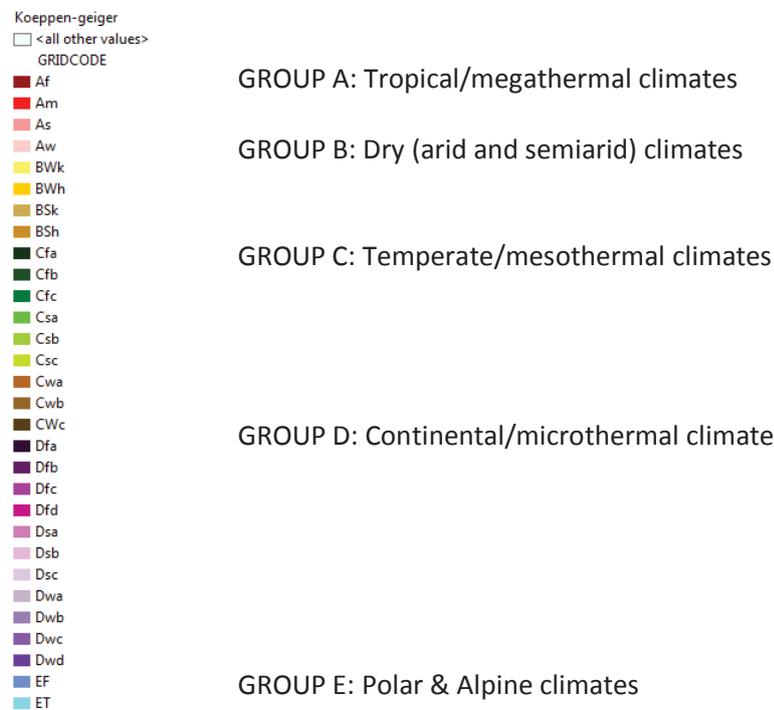
4.3.6.3 Köppen-Geiger climate classification

koeppen-geiger.shp

Köppen climate classification scheme divides world climates into five main groups and several types and subtypes. Each particular climate type is represented by a 2 to 4 letter symbol (see http://en.wikipedia.org/wiki/K%C3%B6ppen_climate_classification for a full breakdown).



Figure 51. Köppen-Geiger climate classification (see key below).



4.3.6.4 WorldClim - Global Climate Data

Downloadable: but very large data sets

Format: ESRI grids

The data can be downloaded from <http://www.worldclim.org/current>

Downloadable data on current world climatic conditions (~1950-2000) at different resolutions – from 30 arc-seconds to 10 arc-minutes. Data includes:

- Min. Temperature
- Max. Temperature
- Mean Temperature
- Precipitation
- Altitude

Each data set has 12 discrete files – one for each month of the year.

In addition, a Bioclim data set has bioclimatic variables derived from the monthly temperature and rainfall values in order to generate more biologically meaningful variables. These are often used in ecological niche modelling. The bioclimatic variables represent annual trends (e.g. mean annual temperature, annual precipitation), seasonality (e.g. annual range in temperature and precipitation) and extreme or limiting environmental factors (e.g. temperature of the coldest and warmest month, and precipitation of the wet and dry quarters). A quarter is a period of three months (1/4 of the year).

4.3.6.5 Natural Earth

Natural Earth is a public domain map dataset available at 1:10m, 1:50m, and 1:110 million scales. Featuring tightly integrated vector and raster data, for cartography or GIS software.

Downloaded data:

- **1:10m Physical Vectors** - A variety of physical regions can be displayed (see Figure 52), as well as a range of elevation points. More information and available data from: <http://www.naturalearthdata.com/downloads/10m-physical-vectors/>
- **1:10m Admin Countries** – country boundaries. More information and available data from: <http://www.naturalearthdata.com/downloads/10m-cultural-vectors/>
- **Natural Earth II with Shaded Relief, Water, and Drainages** - a raster map dataset that portrays the world environment in an idealized manner with little human influence. A successor dataset to the original Natural Earth, Natural Earth II owes its inspiration to the classic physical maps published by the National Geographic Society. The softly blended colours of Natural Earth II make it a suitable base for general-purpose mapping, including historical maps, because it shows the world much as it looked before the modern era. Natural Earth II data comes in several versions for use with cartography and GIS software. More information and available data from: <http://www.naturalearthdata.com/downloads/10m-raster-data/10m-natural-earth-2/> Note: this is very similar to the World Physical Map (Annex 4.3.5.1) provided by ESRI online. This version has the advantage of being downloadable and thus can

operate without an internet connection, but the World Physical Map has considerably better resolution.



Figure 52. Example of 1:10m Physical Vectors from Natural Earth: showing mountain ranges, deserts, steppe, major valley systems, etc, on the back drop of Natural Earth II.

4.3.6.6 Desert

A very simple representation of deserts (desert.shp).



Figure 53. Example of desert backdrop.

4.3.6.7 World Elevation Contours

Downloadable. *World Elevation Contours.lyr*

Feature Dataset: *contours.sdc*

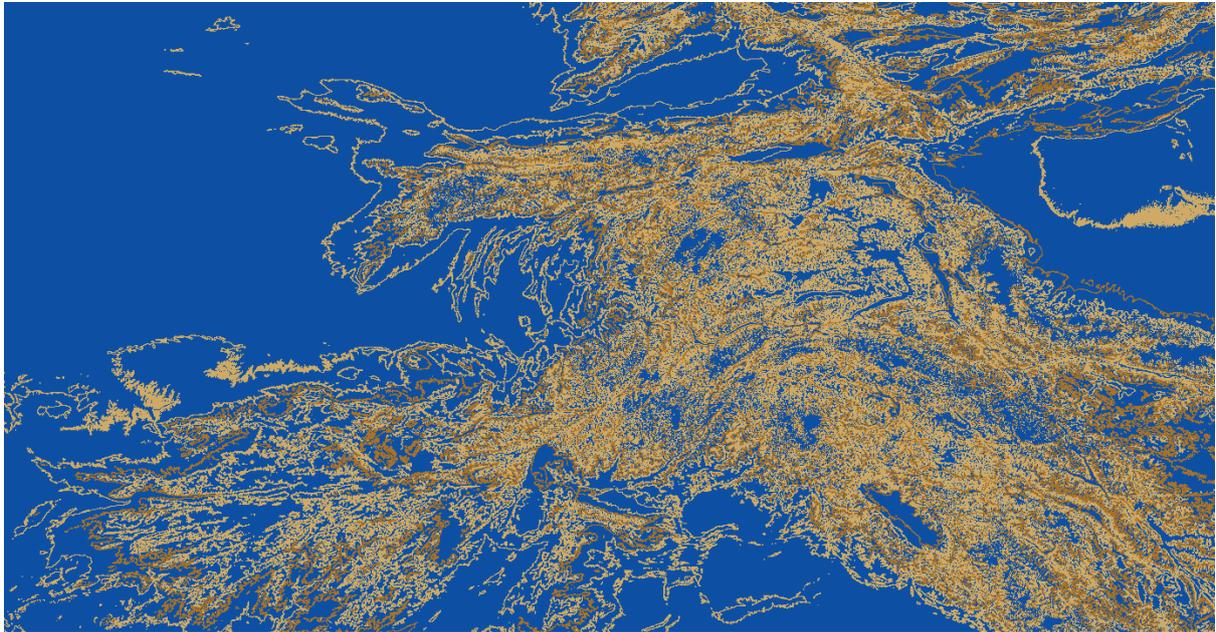


Figure 54. Example of World Elevation Contours (with no backdrop). Individual contours lines can be displayed or re-coloured.

World Contours with 600-meter interval contour lines of the world.

Source: DeLorme Publishing Company, Inc.

4.3.6.8 World Linear Water

Downloadable. *World Linear Water.lyr*

Feature Dataset: *hydrolines.sdc*

World Linear Water represents the narrower rivers and streams of the world.

Source: DeLorme Publishing Company, Inc.

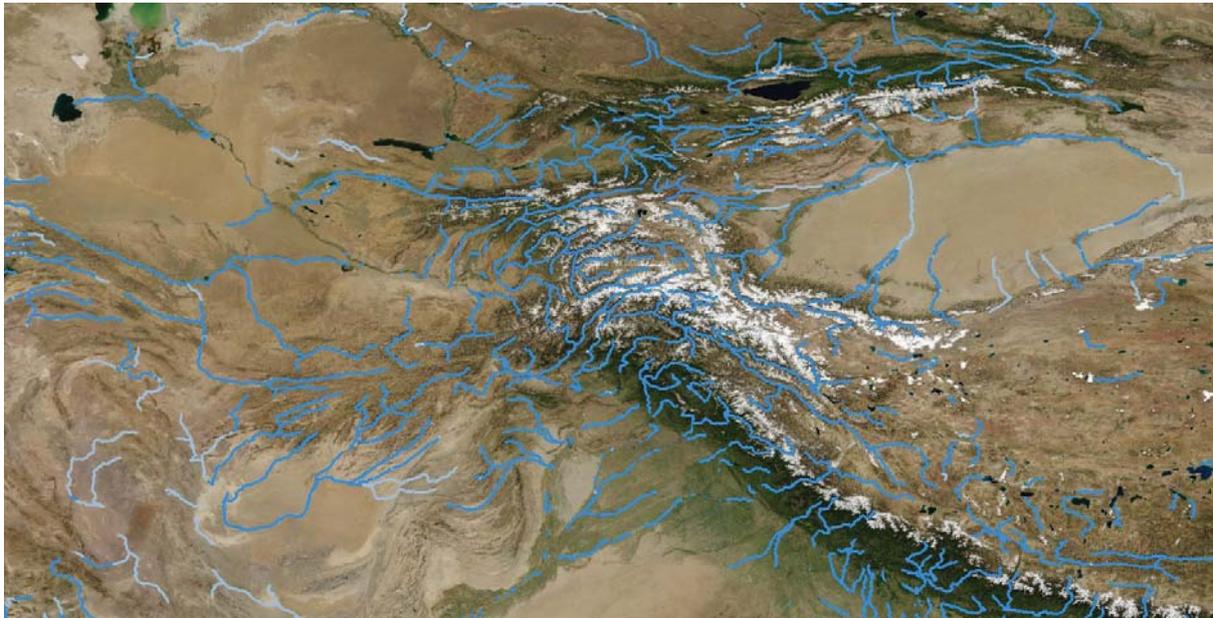
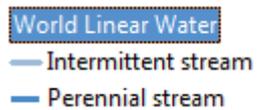


Figure 55. Example of World Linear Water layer, with intermittent and perennial streams.



4.3.6.9 World Drainage Systems

Downloadable. *World Drainage Systems.lyr*

Feature Dataset: *drainage.sdc*

World Drainage Systems represents the major drainage systems of the world.



Figure 56. Example of simple World Drainage System map.

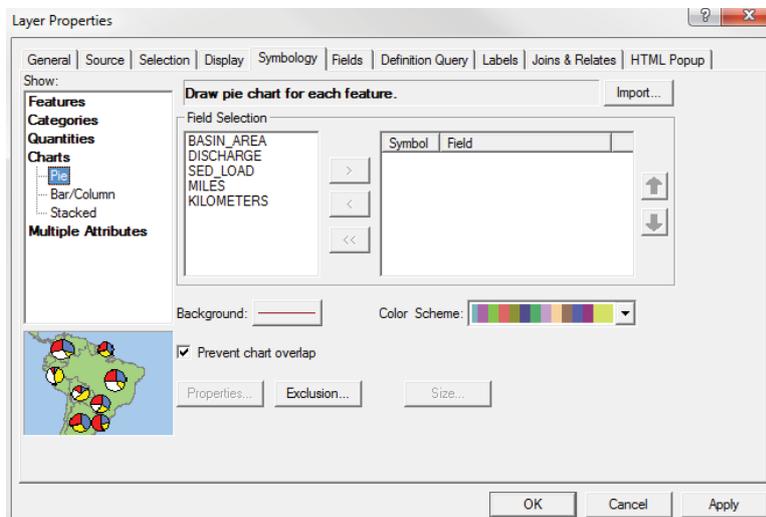


Figure 57. World Drainage Systems: can map and chart basin areas, discharge levels, sedimentation load, and distance.

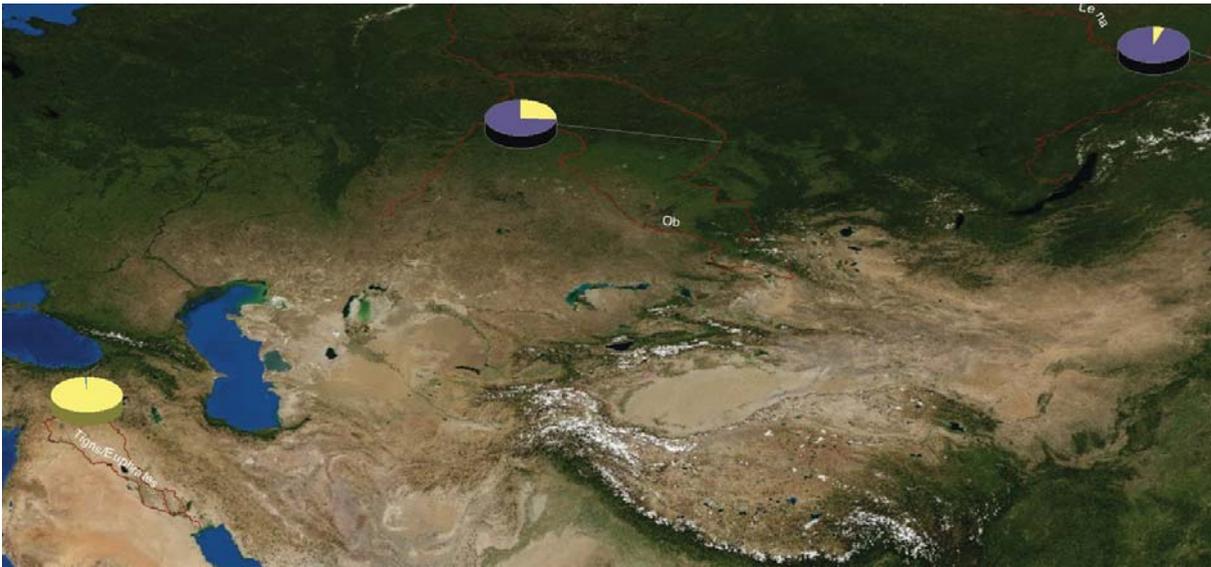
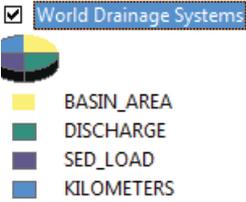


Figure 58. World Drainage Systems: example of charting basin area, sedimentation and discharge.



4.3.6.10 World Gazetteer

Downloadable. World Gazetteer.lyr

Feature Dataset: gaz.sdc

Source: ESRI, CIA World Factbook, GMI



Figure 59. Example of World Gazetteer. Labels and symbols can be rescaled.

World Gazetteer

CATEGORY

- ◆ Airport
- ◆ Coastal feature
- ◆ Drainage feature
- ◆ Island
- ◆ Land feature
- ◆ Ocean feature
- ◆ Political
- ◆ Populated place

World Gazetteer represents the locations and proper names for map features around the world. The gazetteer includes attribute and annotation name information from various layers of the Digital Chart of the World.

4.3.6.11 World Cities

Downloadable. World Cities.lyr

Feature Dataset: cities.sdc

Source: ESRI, CIA World Factbook, GMI, NIMA, Times Atlas 10th



Figure 60. Example of World Cities.

- World Cities
- Population Class
- 5,000,000 and greater
- 1,000,000 to 4,999,999
- 500,000 to 999,999
- 250,000 to 499,999
- ▲ 100,000 to 249,999
- 50,000 to 99,999
- Less than 50,000

World Cities represents the locations of major cities of the world, scaled according to present day populations (or a variety of other fields, such as administrative status).

4.3.7 Software

4.3.7.1 ESRI ArcGIS

This framework has been created in *ESRI ArcGIS*, a commercial software GIS package which allows the combination of scanned maps, imagery, topographic terrain models, coordinate data and linear definition of routes.

The disadvantage with this package is that it is expensive, especially outside academic communities, and relatively complex to use, requiring at least some basic training. There is

an initiative currently underway, via the International Scientific Committee on Archaeological Heritage Management (ICAHM), to establish a license with ESRI for the supply of free copies of the software in support of the World Heritage convention and the protection of archaeological heritage. If this is forthcoming, it may be possible to roll-out the more complex tools.

In the short-term, however, ArcGIS has been used as a data preparation tool, and while the data will be available in this format, the main dissemination of the data has been planned in ArcGIS Explorer and Google Earth (see below).

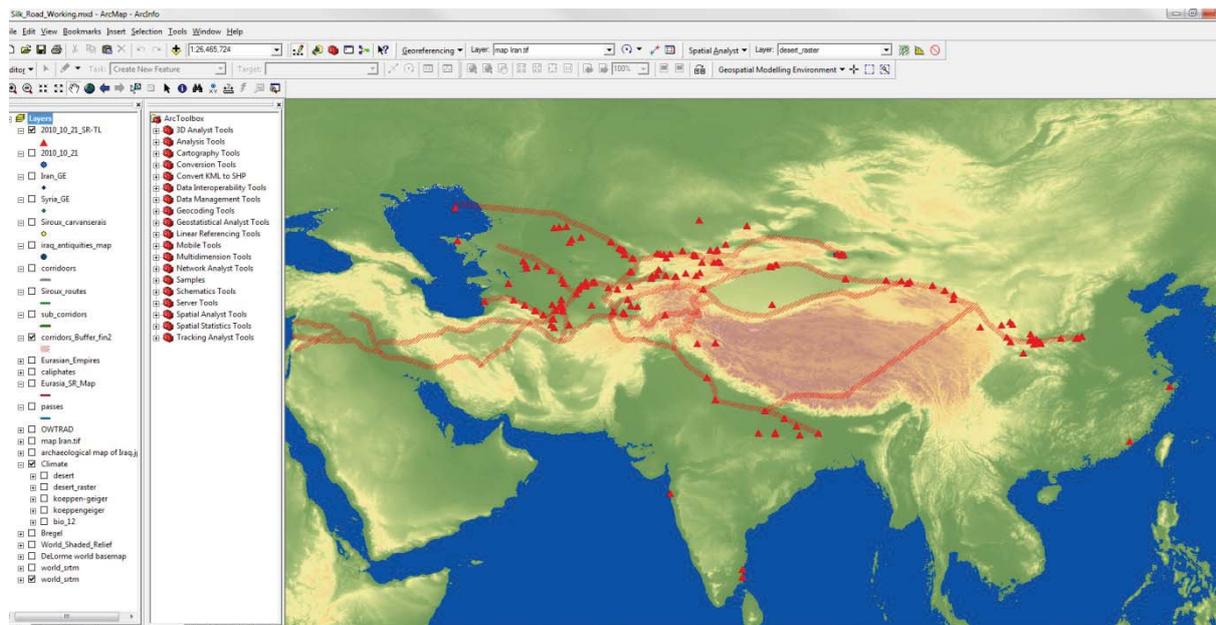


Figure 61. ESRI ArcMap.

4.3.7.2 ArcGIS Explorer

ESRI ArcGIS Explorer Desktop is a free to download and use – see:

<http://www.esri.com/software/arcgis/explorer/index.html>

It is available in English, French, German, Chinese, Spanish and Japanese.

It comes with a number of base maps, but the 'World Imagery' is the most effective for our purposes.

The advantage of this platform is that you can easily view both KML/KMZ files and shapefiles. But it has more significantly limited analytical tools compared to ArcGIS.



Figure 62. ESRI ArcGIS Explorer: showing a detail of an area from China.

4.3.7.3 Google Earth

Easily accessible and free to download, but requires good stable internet connection.

It has access to detailed satellite imagery (e.g. Figure 63).



Figure 63. Ayaz Tepe (Uzbekistan). On the left as seen through ArcGIS Explorer (with the World Imagery basemap) and on the right in Google Earth.

However, there are problems with the patchy backdrop created by numerous satellite images when looking at large areas (e.g. Figure 64).

5 Bibliographic survey

The scale of published resources on the Silk Roads and its archaeology and history is vast. The project collected over 1,500 references to books, and there are many thousands more relevant journal articles, only a few of the more important of which were included in the bibliography. The list will undoubtedly continue to grow and develop in the coming years. Sources were provided by Kazakhstan, Kyrgyz Republic and Uzbekistan (all in Russian), Afghanistan, China, India and Iran (partially in Fārsi), while Japan and Korea also provided some wider synthetic references. However, many of the State Parties have not yet had an opportunity to add all of their material and undoubtedly they will be aware of a wider range of source material which will need to be incorporated.

Rather than produce a static paper version of this resource, the project will release a *digital Silk Roads bibliography* (see Williams forthcoming a)¹. The aim will be to provide searchable text, with some keyword search facilities.

¹ An earlier version of the database was supplied to the Silk Roads CHRIS project and is available at: <http://arex.no-ip.org/specto/bin/view/home>.

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International Council of Monuments and Sites

11 rue du Séminaire de Conflans 94220 Charenton-le-Pont, France

www.icomos.org
secretariat@icomos.org

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