



## **Huludao-Xingcheng Coastal Trail, Liaoning Province, China**

### **Methodology for Landscape Performance Benefits**

### **Case Study Investigation 2017**

#### **Prepared by:**

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The full case study can be found at:

<https://landscapeperformance.org/case-study-briefs/huludao-xingcheng-trail>

## Environmental Benefits

- *Preserved a 60-70-year-old native black pine stand, protecting nearly 100% of existing trees.*

Based on construction drawings and interviews with contractors<sup>[E1]</sup>, the Trail achieved a nearly 100% existing tree retention rate, with fewer than 10 trees removed from locations in extreme conditions and then transplanted to areas nearby. A wide array of design strategies and construction methods (see examples in Figure 1) were utilized to achieve such a high level of tree protection, including routing the Trail to avoid existing trees, especially the high-conservation-value 60-70 year-old native Black Pine stand, building part of the Trail as raised wooden paths, paving the trail with pea gravel concrete which allows enough room for the tree roots to breathe, protecting tree pits with wooden benches or retaining walls made of local pebbles, etc.

Figure 1: Examples of various tree preservation methods.



These site preservation strategies highlighted with aesthetically pleasing designs caught people's attention, as indicated by the survey results that 91% of 64 respondents agree that the landscape design of the trail presented a natural and ecologically healthy environment.

In particular:

- **83%** of all respondents agree that the Trail relieved tourism pressure, and thus protected the ecology of the two most popular beaches;
- **88%** of all respondents agree that the Trail does not negatively impact the ecological environment due to maximum protection of existing forests; and
- **88%** of all respondents agree that landscape improvements that occurred during trail construction overall improved the coastal ecological environment.

***Limitations:***

Although no tree failure was discovered during site investigations in June and July 2017, whether or not all the trees in the middle of or right next to the Trail have thrived remains to be verified by the trail management agency.

In addition, it would have been more ideal if the environmental benefits of ~3,000 new trees planted in barren areas could also be quantified. However, specific information about the quantities of each tree species remained unavailable within the timeframe of this research.

***Sources:***

<sup>[E1]</sup> *Interview with Mr. Ji from the project contractor - China Construction Second Engineering Bureau Ltd.*

- *Generates 6,000 kWh of energy annually using solar photovoltaic lights, meeting 100% of the trail's lighting needs.*

A total of 940 solar photovoltaic lights, including 800 ground lights (GL) and 140 post lights (PL), are used to provide 100% of the outdoor lighting needs for the Trail itself (not including the service areas such as the parking lots). The solar batteries in the lights get charged when there is enough sunshine during the day, releasing energy stored to compensate for the cloudy days. Once fully charged, the post lights can function for as long as 15 days without sunlight, whereas the small ground lights last for only up to 3 days<sup>[a]</sup>. No supplementation from electric grid has been provided so far. If we assume that the lights run an average of 5 hours/day<sup>[b]</sup> (4 hours – 8pm to midnight in summers, 5 hours – 7pm to midnight in spring/fall, 6 hours – 6pm to midnight in winters), and they use up what they generate, then these lights generate a total of 5,986 kWh of electricity per year, as calculated in Table 1 below.

**Table 1: Annual electricity produced (= used) by solar lights.**

<b>Annual electricity produced by ground lights:</b>	$A1 \times A2 \times A3 \times A4 = 876 \text{ kwh}$ $A1 = \text{Number of ground lights (GL)} = 800$ $A2 = \text{Power of GL} = 0.6\text{w}^{[a]}$ $A3 = \text{Avg. hours/day in use} = 5\text{hrs}$ $A4 = \text{days/year} = 365$
<b>Annual electricity produced by post lights:</b>	$B1 \times B2 \times B3 \times B4 = 5110 \text{ kwh}$ $B1 = \text{Number of post lights (PL)} = 140$ $B2 = \text{Battery Power of PL} = 20\text{w}^{[a]}$ $B3 = \text{Avg. hours/day in use} = 5\text{hrs}$ $B4 = \text{days/year} = 365$
<b>Total annual electricity produced</b>	$876 \text{ kwh} + 5,110 \text{ kwh} = 5,986 \text{ kwh}$

<sup>[a]</sup> Based on information provided by contractors;

<sup>[b]</sup> Based on consultation with Mr. Xiaobin Chu, Principal, landscape lighting design specialist, FOCUSCAPE Landscape Design, Beijing, China

If these solar photovoltaic lights were to be replaced by another type of LED post light (see image in Table 2 below) commonly used in Chinese urban parks, the lighting system would have hypothetically consumed 21,900 kwh of electricity per year, consuming 6,899 kg (15,210 lbs) of coal for electricity production, with significant amount of GHG emissions and pollution generation (see detailed calculations below).

**Table 2: Hypothetical coal consumption, GHG emissions, and pollution generated with traditional LED lights.**

	<b>Hypothetical traditional LED post light:</b>  20w Height: 2.8m Unit Price: 2000 RMB (\$294)
<b>Hypothetical electricity use (HEU)</b>	$HEU = C1 \times C2 \times C3 \times C4 = 21,900 \text{ kwh}$ $C1 = \# \text{ of lights (1 pole light per 10m)}^{[a]} = 6000/10 = 600$ $C2 = \text{Power of LED} = 20\text{w}$ $C3 = \text{Avg. hours/day in use} = 5\text{hrs (assuming 4 hours – 8pm to midnight in summers, 5 hours – 7pm to midnight in springs/falls, 6 hours – 6pm to midnight in winters)}^{[a]}$ $C4 = \text{days/yr} = 365$
<b>Coal consumption eliminated</b>	$HEU \times D1 = 6,899 \text{ kg (Coal)} = 15,210 \text{ lbs}$ $D1 = 0.315\text{kg}^{[b]}$ (amount of coal that produces 1 kwh of electricity)

<b>CO<sub>2</sub> eliminated</b>	Coal x E1 = 17,199 kg = 37,917 lbs E1=2.493kg <sup>[c]</sup> (amount of CO <sub>2</sub> emission/1kg coal)
<b>SO<sub>2</sub> eliminated</b>	HEU x F1 = 657 kg F1=0.03kg <sup>[c]</sup> (amount of SO <sub>2</sub> emission/1kwh electricity)
<b>NO<sub>x</sub> eliminated</b>	HEU x G1 = 329 kg G1=0.015kg <sup>[c]</sup> (amount of NO <sub>x</sub> emission/1kwh electricity)
<b>Carbon dust eliminated</b>	HEU x H1 = 5,957 kg H1=0.272kg <sup>[c]</sup> (amount of carbon dust emission/1kwh electricity)

<sup>[a]</sup> Based on consultation with Mr. Xiaobin Chu, Principal, landscape lighting design specialist, FOCUSCAPE Landscape Design, Beijing, China

<sup>[b]</sup> China Energy Statistical Yearbook 2016. Department of Energy Statistics, National Bureau of Statistics, People’s Republic of China. China Statistics Press, 2016.

<sup>[c]</sup> Pollution estimate method referenced at Official website of Ministry of Environmental Protection of the People’s Republic of China. Available at:  
[http://xjs.mep.gov.cn/hjsy/200912/t20091210\\_182848.shtml](http://xjs.mep.gov.cn/hjsy/200912/t20091210_182848.shtml)

### **Limitations:**

The major limitation of the method above is that the assumption that the solar lights run an average of 5 hours/day remains to be verified by the trail management agency. In addition, it would be interesting to find out whether or not the users perceive the Trail as adequately lit, especially during the wet seasons, to evaluate whether more supplementation by the grid needs to be provided.

### **Social Benefits**

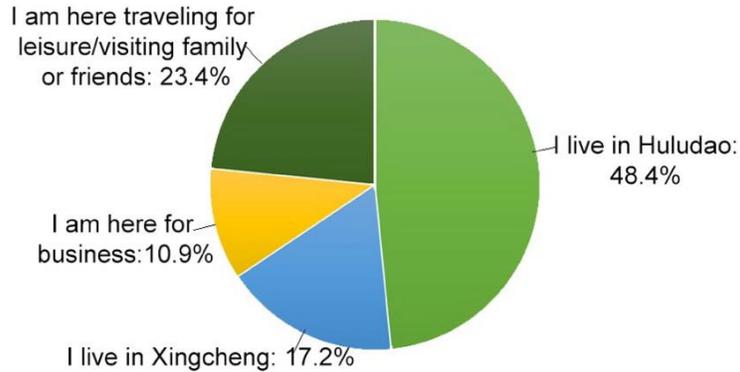
For investigations of social benefits, the research team used a combination of methods including site investigations (6/3-6/4 and 7/2-7/3, 2017), literature review, social survey (June & July 2017), as well as phone and in-person interviews.

To provide more details on the social survey, the research team completed the design of the survey instrument in May and obtained IRB approval on May 24, 2017. The survey targeted residents of the two cities of Huludao and Xingcheng and tourists visiting the Trail. Main topics explored included: frequency, timing, duration of trail use, means/cost of transportation, primary activities, average trip expenses, understanding of the environmental, cultural and educational features, perception of potential environmental, social, and economic benefits, satisfaction with overall design, and so on (see Appendix I for the survey instrument).

The survey was implemented in Mandarin through two channels. First, the online version was distributed via the WeChat Mobile App with the survey itself hosted on [www.sojump.com](http://www.sojump.com), in consideration of the overwhelming preference of mobile phone vs. computer use. Second, an intercept survey was implemented on the trail on Sunday 7/2 and Monday 7/3, 2017. Up until

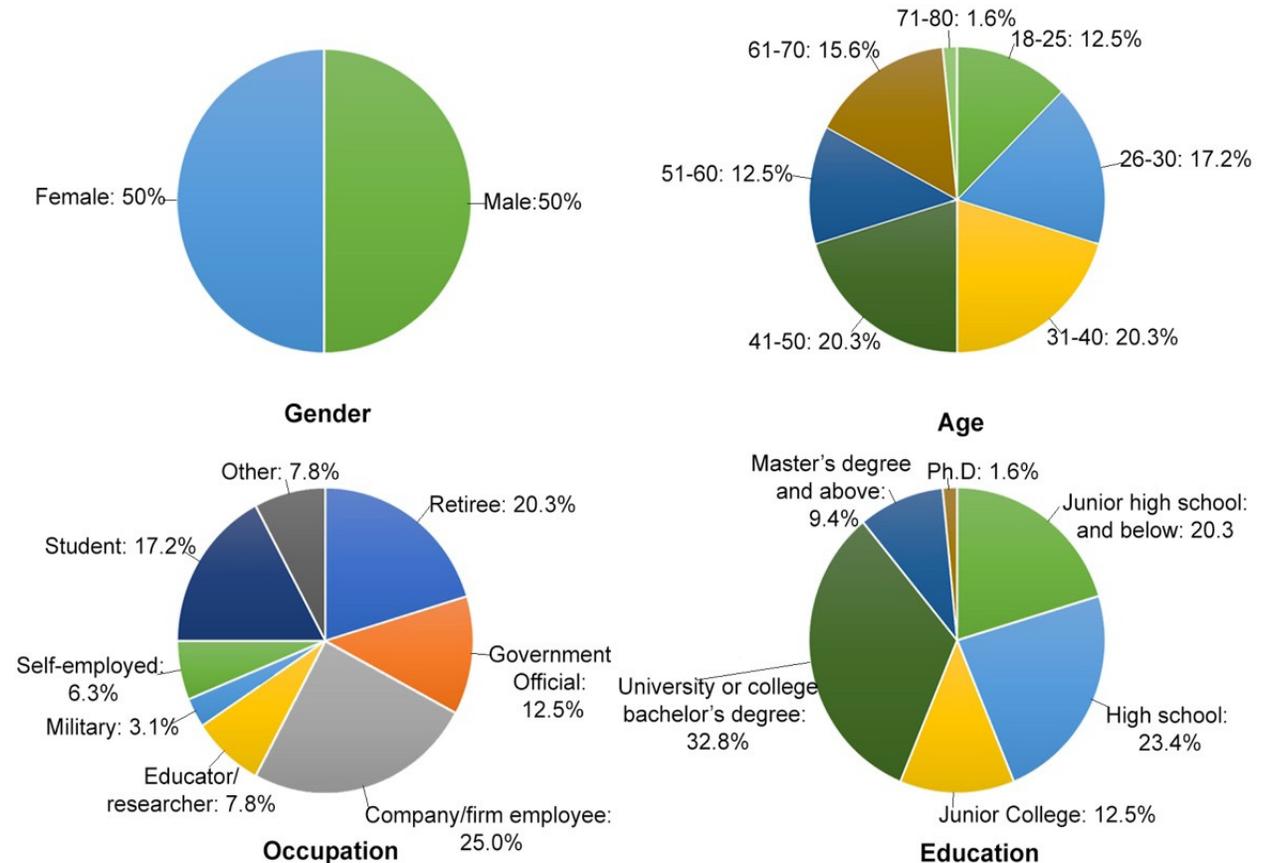
July 17, 2017, the survey received a total of 64 responses (online 21, intercept 43) from 42 residents (66%) and 22 visitors (34%) (Figure 2, also see Figure 3 for an overview of the demographic information). Due to people’s concerns on mobile identity theft, the online survey received fewer responses than expected.

Figure 2: Survey respondents’ profile.



In the following section, we first provide a brief overview of the survey results, and then elaborate on potential social benefits summarized from the data.

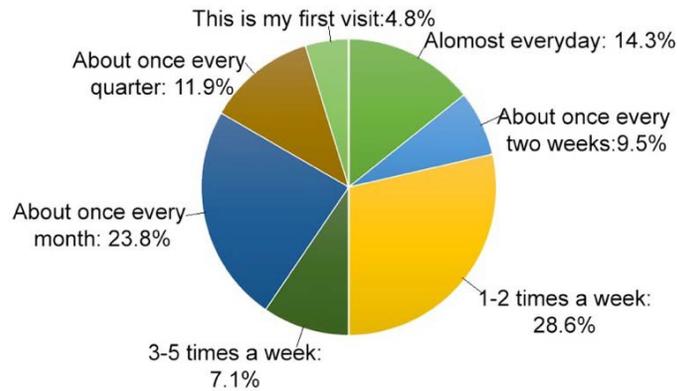
Figure 3: Survey respondent demography.



**OVERVIEW OF SURVEY RESULTS:**

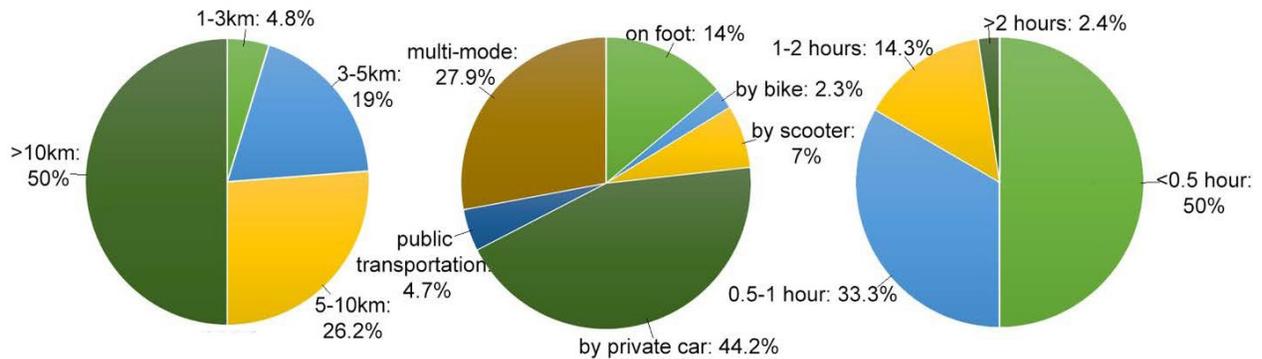
- 42 residents and 22 visitors completed the survey;
- 50% of the 42 residents use the Trail at least weekly, 21% use the Trail >3 times/week, and 14% use the Trail every day (Figure 4);

**Figure 4: Frequency of trail use by residents.**



- 63.6% of the tourists reported this trip as their first time coming to the Trail;
- Residents' median duration of stay at the Trail was 1.5 hours for each visit;
- People live or stay relatively far away from the Trail, with 76% traveling from >5km (~3.1 miles) way, and 50% from >10km (~6.2 miles) away (Figure 5). Most tourists arrived by vehicles (48% private cars, 19% public transportation). For the locals, transportation modes were more diversified, with a majority of 44% by private car. The overall one-way travel time was 50% within half an hour and 83% within one hour (Figure 5).

**Figure 5: One-way travel distance from/to the Trail (left); transportation modes (middle); and one-way travel time from/to the Trail (right) (all statistics include both residents and tourists).**



## SOCIAL BENEFITS:

- *Attracts an estimated 10,000 residents per day for recreational activities and serves as a tourist destination for 3 million visitors per year, with a maximum visitation of 35,000 per day from mid-June to mid-October.*

Impressive visitation numbers were obtained through interviews with agency officials, suggesting that the Trail has truly become an important daily destination for residents, as well as a popular sightseeing attraction for visitors.

### *Residents' visitation:*

- An estimate of 10,000<sup>[S1]</sup> residents exercise at the Trail every day, particularly in the mornings and evenings;
- As mentioned above, 50% of the resident respondents use the Trail at least weekly, 21% use the Trail for >3 times/week, and 14% use the Trail every day (Figure 4).

### *Tourists' visitation:*

- An official estimate of 3,000,000<sup>[S1]</sup> tourists visit the Trail annually;
- During peak season (Mid June – Mid October), maximum visitation at the Trail reaches 35,000<sup>[S1]</sup> per day.

### *Limitations:*

The major limitation of the method above is that no *formal* visitation records became available during the timeframe of this research, so we had to rely on interviews with agency officials. The daily resident visitation estimate of 10,000 remains to be verified due to its source from an informal estimate by the Huludao Longwan Central Business District Management Commission. With that said, the annual tourist visitation of 3,000,000 and peak daily visitation of 35,000 are credible because they came from statistics by the Huludao Tourism Bureau.

### *Sources:*

<sup>[S1]</sup> Interview with Mr. Guofeng Lu, Director, Longwan Central Business District Management Commission, Huludao City

- *Helps to accommodate over 100 festivals, competitions, and other events annually in Huludao and Xingcheng. The trail encourages social interactions within or between the two cities for 91% of 42 surveyed residents.*

The fact that the Trail connects the two largest event plazas of Huludao and Xingcheng, i.e., the International Peace Plaza and Bikini Plaza (Figure 7), makes it part of a heavily-used open space system that hosts the most majority of the two cities' social and commercial events. The 42-acre International Peace Plaza sits where the Central Business District of Huludao meets the beach, next to the stadium and natatorium. The 31-acre Bikini Plaza, located at the NE end of the Xingcheng Beach, was created to host the annual International Swimsuit Festival and other

important events for Xingcheng, the “Swimwear Town of China” that produces 30% of the world’s swimsuits.

Figure 7: International Peace Plaza (left) and Bikini Plaza (right).



Official records indicate that an average of 2 events per week<sup>[53]</sup>, totaling 104 events annually, have been hosted in the open space system between the two plazas. These events may include nationally- and internationally-important events such as the Chinese National Games and International Swimsuit Festivals, as well as other municipal- or community-level cultural, social, and commercial events, e.g., Chinese spring festival celebration, speed walking contests hosted by governmental agencies and private companies, etc. Events encouraging physical activities use the Trail as the primary space, although many others focus only on plaza activities. Despite the unknown exact number of events hosted on the Trail, the connection created between the two plazas diversifies the ways events can be organized, enriches the event experience, and substantially increases the capacity of the events.

In addition to the estimates for social events, the social survey results also supported the Trail’s positive impacts of encouraging social interactions:

- 83% of 42 residents agree that the Trail increases their social activities;
  - 91% of 42 residents agree that the Trail improves social interactions between the two cities.
- 
- *Improves physical health and diversifies opportunities for recreational activity according to 93% of 42 surveyed residents. The trail supports at least 22 types of outdoor activities and at least 35 exercise groups.*

The social survey and site investigations indicated that residents mainly come to the Trail for exercising, enjoying the coastal scenery, and relaxing/hanging out with family. We recorded a total of 22 types of outdoor activities residents primarily partake in at the Trail, among which the top 3 are strolling, speed walking, and jogging/running, all related to daily exercises. Table 3 below listed the 12 types of activities that at least 10% of the resident respondents reported as their primary activities. The other 11 types include people-watching, dating, Taiji, cycling, dining by the sea, picnicking, playing diabolo, singing/practicing traditional opera, taking wedding

photos, and picking wild vegetables. The wide range of activities observed also accords well with the survey results where 93% of 42 residents agree that the Trail diversifies their recreation activities.

Another interesting finding is that the resident respondents chose the Trail for 15 types of activities because no other better alternative open space is available to accommodate these activities (termed “exclusive activities” hereafter). The top 3 ranked exclusive activities include strolling, speed walking, and enjoying coastal scenes (Table 4), again emphasizing the indispensable role of the Trail for providing exercising spaces and coastal views.

**Table 3: Residents’ primary outdoor activities at the Trail.**

#	Type of activities	% of pp. reported as primary activities
1	Strolling	83%
2	Speed walking	57%
3	Jogging/running	57%
4	Enjoying coastal scenes	40%
5	Leisure activities with family	40%
6	Gathering with friends	29%
7	Photographing	26%
8	Walking dog(s)	14%
9	Observing plants/wildlife	14%
10	Relaxing/Hanging out	12%
11	Community/Commercial events	12%
12	Swimming/beach activities	10%

**Table 4: Residents’ exclusive outdoor activities at the Trail.**

#	Type of activities	% of pp. reported as exclusive activities
1	Strolling	24%
2	Speed walking	17%
3	Enjoying coastal scenes	12%
4	People-watching	5%
5	Leisure activities with family	5%
6	Gathering with friends	5%
7	Photographing	5%
8	Relaxing/Hanging out	2%
9	Walking dog(s)	2%
10	Observing plants/wildlife	2%
11	Jogging/running	2%
12	Dining by the sea	2%
13	Dating	2%
14	Taking wedding photos	2%
15	Picking wild vegetables	2%

93% of the 42 resident respondents agree that the Trail improves their own health, based on the visitation numbers and the frequency of trail use presented above. What is more, our encounter with speed walking clubs and competitions (Figure 6) during site visits encouraged us to look deeper into the recent rapid growth of outdoor activity clubs/groups in the region, and the degree to which the Trail might have contributed to such growth.

Figure 6: Speed walking club in action (left); Award ceremony for speed walking competition (right).



The stressful urban lifestyle, on top of the degraded urban environment with very limited open space, has created a great concern for health as well as a great need for outdoor exercises. Relying mainly on social media network search, we discovered a total of 35 outdoor exercising and walking clubs/groups, with a total of 6916<sup>1</sup> members. 77% of these clubs (27 of 35) were established after the south section of the Trail was completed in Aug. 2012. Although it is difficult to characterize how exactly the Trail has influenced the Club phenomenon, the lively landscape activated by people exercising on the Trail conveys a convincing message that the Trail promotes a healthy lifestyle by encouraging more physical activities and social interactions.

In summary, the Trail influences people's quality of life in the following ways according to the social survey:

- 93% of 42 residents agree that the Trail improves their physical health;
- 93% of 42 residents agree that the Trail diversifies their recreation activities;
- 83% of 42 residents agree that the Trail enhances their social interactions (we will expand on this aspect in the section that follows);
- In addition, 69% of the residents characterized the Trail as an important summer destination for escaping the heat, among which 48% emphasized it as being extremely important in this regard.
- 93% of 42 residents agree that the trail improves their quality of life.

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<sup>1</sup> This number may not be 100% accurate as people can join multiple clubs.

- Expresses traditional Chinese shan-shui landscape design principles according to 95% of 64 survey respondents.

One of the major design goals was to express nature’s shan-shui (mountain-water) beauty and provide a cultural landscape appreciation experience. To achieve that, critical natural and cultural resources were first identified through site investigations. Those with superior natural beauty, including the Turtle Mount, Eagle Mouth Mount, Black Pine forest, flower valley, and Rock Shoal, were strictly preserved as targets for scenic views. Those with cultural significance, including the Dragon Look Back plaza and Mazu Temple, were highlighted as viewing platforms or walking destinations. Exceptional places for viewing these resources, as well as the mountain peaks, city, and ocean in distance, were then identified through site surveying. Those places became locations for viewing platforms and pagodas (Figure 8). Every structure on the sight lines was carefully designed in terms of form and scale.

Figure 8: Connecting major focal points through sight lines (above); examples of platforms for viewing the Eagle Mouth Mt. (middle) and ocean, mountains, and the city in distance (below).



The social survey results indicate that the hope to evoke cultural learning has been successful and the design did give expression to Chinese traditional shan-shui landscape design culture:

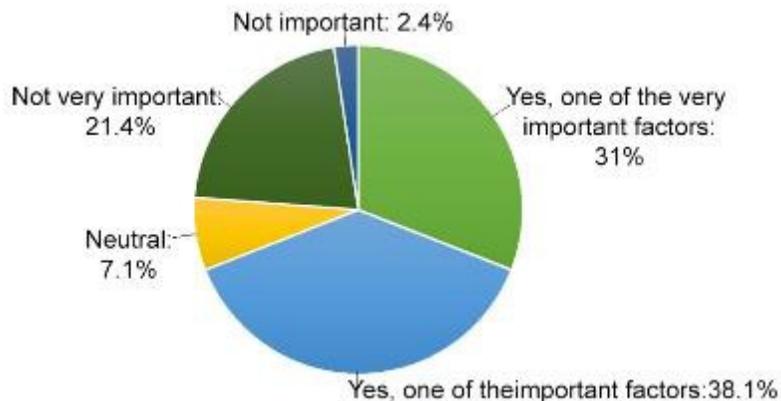
- 95% of 64 respondents agree that landscape design of the Trail gave expression to nature’s shan-shui (mountain-water) beauty;
  - 78% of 64 respondents agree that they have perceived spiritual implication of Chinese traditional culture while visiting the Trail.
- 
- *Improves understanding of ecological protection according to 84% of 62 survey respondents.*

The public can view strategies used to protect the ecology of the region on site through the design’s visual highlighting of sustainable landscape practices such as the black pine tree conservation in the middle of the trail. The social survey reported that an overall 84% of surveyed visitors, including 86% of 42 residents and 80% of 20 visitors, agree that the Trail improves their own understanding of ecological protection.

- *Influenced housing choice for 69% of 42 surveyed residents.*

69% of the residents reported that “adjacency to the Trail” has been/will be an important factor to consider in their decision of locating their residence, among which 31% emphasized it as being an “extremely important” factor (Figure 9).

Figure 9: Importance of “adjacency to the Trail” in housing choice.



**Limitations:**

Ideally, this benefit would have been better quantified through a more thorough investigation into the level of actual influence of the Trail in people’s housing choice. We looked into new housing development adjacent to the Trail, but none of them have completed construction at this time although presale of units has already started. It would be interesting to return to this research a few years later to investigate how the Trail had influenced people’s housing choice.

### *Limitations (for the overall social survey):*

Although the intercept survey was efficient in collecting people's responses, the fact that we only had 2 research assistants for a two-day survey was the key constraint in achieving a larger sample size. The main responses were collected between 9am to 9pm, missing the early morning trail users. A better way to implement the online survey should be further explored, which would not only more efficiently increase the sample size, but also potentially reveal different perspectives of those who do not use the Trail as frequently.

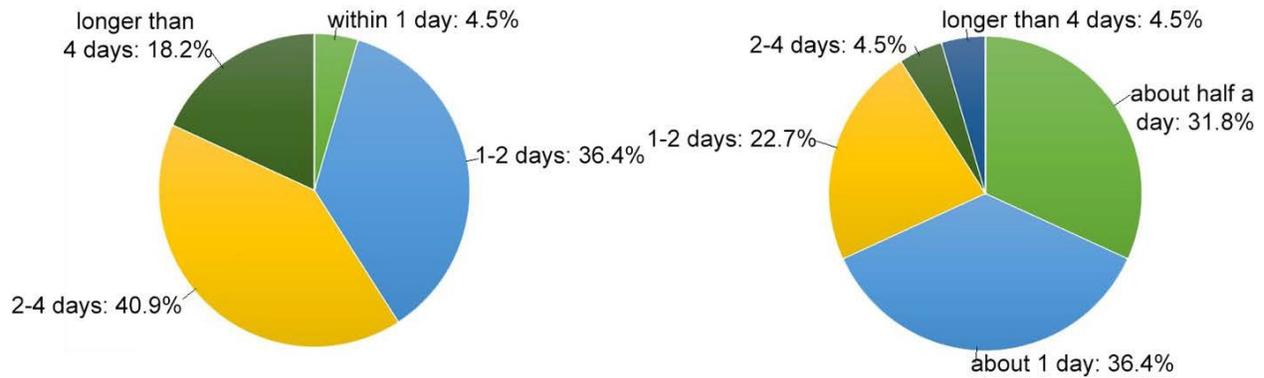
## Economic Benefits

- *Substantially contributed to an 84% increase in local tourism revenue from 2011 to 2014. The trail also generates an estimated \$33-\$55 million annually in direct visitor spending.*

Based on governmental reports<sup>[ECON1]</sup> and interviews with agency officials<sup>[ECON2]</sup>, the Trail has made a substantial contribution to local tourism industry, whose revenue increased by 84% from 2011 to 2014 from \$2.12 to \$3.92 billion. The social survey also indicates a 95% agreement (out of 62 respondents) with the proposition that the Trail promotes tourism development. The complexity of the issue made it almost impossible to tease out the specific contribution from the Trail because the revenue statistics could not be isolated to the area of the Trail itself. As a result, we qualitatively describe the ways the Trail may have contributed to local tourism development:

- An official estimate indicates that, during peak season (mid June – Mid October), maximum visitation at the beaches/Trail increased from 20,000 to 35,000 per day<sup>[ECON2]</sup>.
- An official estimate indicates that tourists' duration of stay at the beaches has extended from an average of 2.5 hours to 4 hours<sup>[ECON2]</sup>.
- An official estimate indicates that tourists' duration of stay in the two cities has extended from 1-2 days to 3-4 days<sup>[ECON2]</sup>. This aligns well with our survey results indicating a median of overall 2-4 days spent by visitors for their entire trip (Figure 10).
- The social survey indicates that the median duration of stay at the Trail itself is 1 day (Figure 10), with 68% of visitors staying for either a half day or 1 day, 32% staying for longer than 1 day (this was a pleasant surprise as we did not expect many people to stay longer than 1 day at the Trail itself).
- The social survey indicates a 90% (out of 20) agreement among the tourists that the Trail enriches their travel experience; a 95% agreement among the tourists that the Trail enhances the image of the cities; and a 95% agreement among all 62 respondents that the Trail promotes tourism development.

Figure 10: Tourists' Duration of stay at the cities (left); Tourists' Duration of stay at the Trail (right).



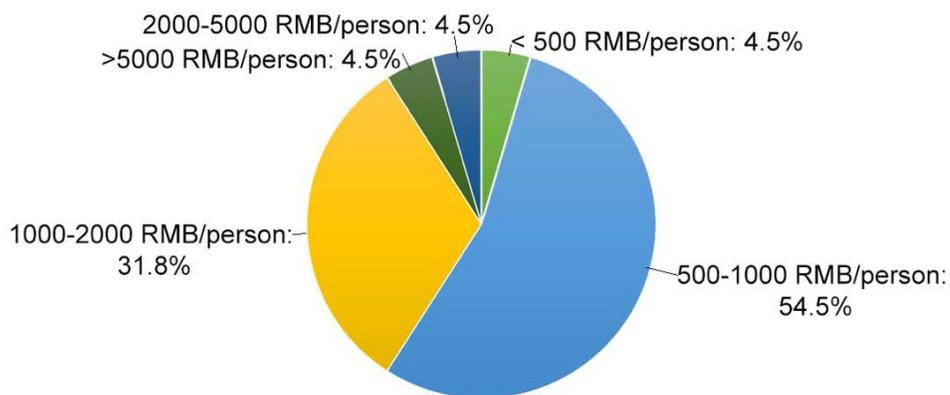
Based on the survey results, the median total trip cost for tourists (excluding transportation from & to Huludao) for their entire visit was 750 RMB/person (Figure 11). If we use the median of 3 days as a typical trip length, tourists' average expenses = 250 RMB/person/day. If we conservatively assume that the tourists' average duration of stay at the Trail itself is ½ day (instead of the median of 1 day mentioned above), given the official estimate of 3,000,000 annual visits, the direct visitor spending attributed to the Trail:

$$250 \text{ RMB/day} \times 0.5 \text{ day} \times 3,000,000 = 55 \text{ million dollars}$$

Even with the assumption that tourists' average expenses = 150 RMB/person/day, a lower end based on experience from our own site investigations, the total visitor spending sums up to:

$$150 \text{ RMB/day} \times 0.5 \text{ day} \times 3,000,000 = 33 \text{ million dollars}$$

Figure 11: Per person visitor expenses for entire trip (excluding transportation from home city to Trail).



**Limitations:**

The major limitation of the method above is that the gross tourism revenue of the entire city could not be isolated to the Trail itself. We explored whether or not other new or redevelopment projects to boost tourism development occurred at the same time of the Trail, but were unsuccessful in obtaining enough information in order to make the distinction. In addition, the

tourism revenue of 2015 & 2016 was not included because of inconsistency in spatial scope included.

With regard to the inquiries through the survey, we found that the survey could have been designed in a more straightforward way, asking tourists to fill out their trip expense/day/person, instead of choosing from coarse expense categories that created difficulty calculating direct visitor spending based on visitation numbers.

**Sources:**

<sup>[ECON1]</sup> *Huludao City Government Annual Work Reports, 2011, 2012, 2013 & 2014.*

<sup>[ECON2]</sup> *Interview with Mr. Guofeng Lu, Director, Longwan Central Business District Management Commission, Huludao City.*

- *Created 50-60 jobs in trail management, including service facility management, security, and cleaning services.*

According to interview with Mr. Lu<sup>[ECON2]</sup>, about 50 to 60 positions were created to manage the Trail, including service facility management (parking lots, convenience stores, restrooms, etc.), security, and cleaning services. In addition, commissioning landscape maintenance work to an independent firm indirectly created substantial job opportunities for citizens.

**Limitations:**

The specific numbers of job positions in each category remain to be confirmed by the management agency of the Trail.

**Sources:**

<sup>[ECON2]</sup> *Interview with Mr. Guofeng Lu, Director, Longwan Central Business District Management Commission, Huludao City.*

## Cost Comparison Method

One of the major challenges in routing the trail was the cold climate and ice-prone shoreline. The trail rises and falls in topography between the shoreline and cliff. If the trail were to be built entirely on the shoreline, the construction would have cost \$17.7 million due to the structural engineering required to withstand the hundreds of tons of sea ice that are pushed to the shore annually. This is over 3 times the cost of the trail as it was built. This estimate was provided by Mr. Guofeng Lu, Director, Longwan Central Business District Management Commission, Huludao City.

## Appendix I – Survey Instrument: Use and Perception of the Huludao-Xingcheng Coastal Trail Landscape<sup>†</sup>

1. Please choose according to your status:
  - I live in Huludao.
  - I live in Xingcheng.
  - I am here for business.
  - I am here traveling for leisure/visiting family or friends.
  - Other (please specify): \_\_\_\_\_

<i>[Residents Only]</i>	<i>[Visitors Only]</i>
<ol style="list-style-type: none"> <li>2. On average, how often do you visit Huludao-Xingcheng Coastal Trail?               <ul style="list-style-type: none"> <li><input type="radio"/> Almost every day (6-7 times/week)</li> <li><input type="radio"/> 3-5 times a week</li> <li><input type="radio"/> 1-2 times a week</li> <li><input type="radio"/> About once every two weeks</li> <li><input type="radio"/> About once every month</li> <li><input type="radio"/> About once every quarter</li> <li><input type="radio"/> This is my first visit</li> <li><input type="radio"/> Other (please specify): _____</li> </ul> </li> </ol>	<ol style="list-style-type: none"> <li>2. Which city/county do you currently live in?</li> </ol>
<ol style="list-style-type: none"> <li>3. Typically, which days do you come to the Trail?               <ul style="list-style-type: none"> <li><input type="radio"/> Weekdays</li> <li><input type="radio"/> Weekends</li> <li><input type="radio"/> Holidays</li> <li><input type="radio"/> Depends on my schedule</li> </ul> </li> </ol>	<ol style="list-style-type: none"> <li>3. How many times have you been to this Trail?</li> </ol>
<ol style="list-style-type: none"> <li>4. What time of the day do you typically arrive at the Trail?               <ul style="list-style-type: none"> <li><input type="radio"/> Before 6:00</li> <li><input type="radio"/> 6:00-9:00</li> <li><input type="radio"/> 9:00-12:00</li> <li><input type="radio"/> 12:00-15:00</li> <li><input type="radio"/> 15:00-18:00</li> <li><input type="radio"/> After 18:00</li> <li><input type="radio"/> Multiple times a day</li> <li><input type="radio"/> Not always the same, depending on my schedule</li> </ul> </li> </ol>	<ol style="list-style-type: none"> <li>4. Who are you traveling with this time?               <ul style="list-style-type: none"> <li><input type="checkbox"/> Just myself</li> <li><input type="checkbox"/> Family</li> <li><input type="checkbox"/> Friends</li> <li><input type="checkbox"/> Colleagues</li> <li><input type="checkbox"/> A tourist group</li> <li><input type="checkbox"/> Other (please specify): _____</li> </ul> </li> </ol>
<ol style="list-style-type: none"> <li>5. How far away do you live from the Trail?               <ul style="list-style-type: none"> <li><input type="radio"/> &lt; 1 km</li> <li><input type="radio"/> 1-3 km</li> <li><input type="radio"/> 3-5 km</li> <li><input type="radio"/> 5-10 km</li> <li><input type="radio"/> &gt; 10 km</li> </ul> </li> </ol>	<ol style="list-style-type: none"> <li>5. What is the total length of your trip?               <ul style="list-style-type: none"> <li><input type="radio"/> Within 1 day</li> <li><input type="radio"/> 1-2 days</li> <li><input type="radio"/> 2-4 days</li> <li><input type="radio"/> Longer than 4 days</li> </ul> </li> </ol>

<sup>†</sup>The actual survey was implemented in Mandarin.

<p>6. How do you usually arrive at the Trail?</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> On foot</li> <li><input type="checkbox"/> By bike</li> <li><input type="checkbox"/> By scooter</li> <li><input type="checkbox"/> By private car</li> <li><input type="checkbox"/> Public transportation</li> <li><input type="checkbox"/> Multi-mode (please specify): _____</li> </ul>	<p>6. How much time in total did/will you spend at the Trail?</p> <ul style="list-style-type: none"> <li><input type="radio"/> About half a day</li> <li><input type="radio"/> About 1 day</li> <li><input type="radio"/> 1-2 days</li> <li><input type="radio"/> 2-4 days</li> <li><input type="radio"/> Longer than 4 days</li> </ul>
<p>7. What is your traveling time to get to the Trail (one way)?</p> <ul style="list-style-type: none"> <li><input type="radio"/> &lt; 0.5 hour</li> <li><input type="radio"/> 0.5-1 hour</li> <li><input type="radio"/> 1-2 hours</li> <li><input type="radio"/> &gt; 2 hours</li> </ul>	<p>7. How did you arrive at the Trail Park?</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> On foot</li> <li><input type="checkbox"/> By bike</li> <li><input type="checkbox"/> By scooter</li> <li><input type="checkbox"/> By private car</li> <li><input type="checkbox"/> Public transportation</li> <li><input type="checkbox"/> Multi-mode (please specify): _____</li> </ul>
<p>8. How much is the overall daily transportation cost to get to the Trail?</p> <ul style="list-style-type: none"> <li><input type="radio"/> None</li> <li><input type="radio"/> &lt; 2 RMB</li> <li><input type="radio"/> 2-5 RMB</li> <li><input type="radio"/> 5-20 RMB</li> <li><input type="radio"/> &gt; 20 RMB</li> <li><input type="radio"/> Please enter the specific amount here if you will: _____</li> </ul>	<p>8. What is the total cost (per person) of your trip (not including transportation from your city to Huludao or Xingcheng)?</p> <ul style="list-style-type: none"> <li><input type="radio"/> &lt; 500 RMB/person</li> <li><input type="radio"/> 500-1000 RMB/person</li> <li><input type="radio"/> 1000-2000 RMB/person</li> <li><input type="radio"/> 2000-5000 RMB/person</li> <li><input type="radio"/> &gt;5000 RMB/person</li> </ul>
<p>9. On average, how much time per day do you spend at the Trail?</p> <ul style="list-style-type: none"> <li><input type="radio"/> Within 0.5 hour</li> <li><input type="radio"/> 0.5-1 hour</li> <li><input type="radio"/> 1-2 hours</li> <li><input type="radio"/> 2-4 hours</li> <li><input type="radio"/> More than 4 hours</li> </ul>	
<p>10. In summers, is the Trail an important destination for you to stay out of the heat?</p> <ul style="list-style-type: none"> <li><input type="radio"/> Yes, very important.</li> <li><input type="radio"/> Yes, important</li> <li><input type="radio"/> Neutral</li> <li><input type="radio"/> Not so important</li> <li><input type="radio"/> Not important</li> </ul>	

<p>11. What are the primary activities that you participate while at the Trail? (check all that apply).</p> <p>Leisure</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Relaxing/hanging out</li> <li><input type="checkbox"/> Strolling</li> <li><input type="checkbox"/> Walking dog(s)</li> <li><input type="checkbox"/> Reading</li> <li><input type="checkbox"/> Observing plants/wildlife</li> <li><input type="checkbox"/> Enjoying coastal scenes</li> <li><input type="checkbox"/> People-watching</li> </ul> <p>Physical Activities</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Jogging/Running</li> <li><input type="checkbox"/> Speed walking</li> <li><input type="checkbox"/> Cycling</li> <li><input type="checkbox"/> Dancing/aerobics</li> </ul> <p>Family recreation and socialization</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Kiting in the square</li> <li><input type="checkbox"/> Swimming/beach activities</li> <li><input type="checkbox"/> Leisure activities with family</li> <li><input type="checkbox"/> Picnicking</li> <li><input type="checkbox"/> Gathering with friends</li> <li><input type="checkbox"/> Dating</li> <li><input type="checkbox"/> Dining by the sea</li> </ul> <p>Talent cultivation</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Photographing</li> <li><input type="checkbox"/> Qigong</li> <li><input type="checkbox"/> Taiji</li> <li><input type="checkbox"/> Playing instruments</li> <li><input type="checkbox"/> Playing diabolo</li> <li><input type="checkbox"/> Singing/practicing traditional opera</li> </ul> <p>Other:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Community/Commercial events</li> <li><input type="checkbox"/> Taking wedding photos</li> <li><input type="checkbox"/> Picking wild vegetables</li> <li><input type="checkbox"/> Working (maintenance, cleaning, etc.)</li> <li><input type="checkbox"/> Other (please specify):</li> </ul>	
<p>12. From the list above, select the activities you choose to participate at the Park because no other open spaces are easily available to you to accommodate them.</p>	
<p>13. Are you a member of some walking/hiking club?</p> <ul style="list-style-type: none"> <li><input type="radio"/> Yes</li> <li><input type="radio"/> No</li> </ul>	
<p>14. On average, how often does your club come to the Trail for group activities?</p> <ul style="list-style-type: none"> <li><input type="radio"/> Almost every day (6/7 times per week)</li> <li><input type="radio"/> 3-5 times a week</li> <li><input type="radio"/> 1-2 times a week</li> <li><input type="radio"/> About once every two weeks</li> <li><input type="radio"/> About once every month</li> <li><input type="radio"/> About once every quarter</li> </ul>	

<p>15. If you are willing to, please specify the following information:</p> <ul style="list-style-type: none"> <li>o The name of the club: _____</li> <li>o Total # of members in the club: _____</li> <li>o Club's contactInfo: _____</li> </ul>	
<p>16. If you regularly participate in any other club/group activities at the Trail, please specify the activities and their frequency, and the club/group name (if applicable).</p>	
<p>17. In terms of the environmental impacts of the Trail, please indicate how much you agree with the following statements [Scale: Strongly Disagree, Moderately Disagree, Neutral, Moderately Agree, Strongly Agree]:</p> <ul style="list-style-type: none"> <li>o In general, the development of the Trail on green land caused disturbance and negative impacts to the coastal environment to a certain degree.</li> <li>o The Trail relieved tourism pressure on the Huludao and Xingcheng beaches, thus protected the ecology of these two beaches.</li> <li>o Due to maximum protection of existing forests, the Trail does not negatively impact the ecological environment</li> <li>o Landscape improvements that occurred during Trail construction overall improved the coastal ecological environment.</li> <li>o Landscape design of the Trail improved my understanding about conservation of coastal ecology.</li> </ul>	
<p>18. If you have already purchased a residence / plan to purchase a residence in the future, was/would "proximity to the Trail" be one of the factors for selecting the location of your residence?</p> <ul style="list-style-type: none"> <li>o Yes, one of the very important factors.</li> <li>o Yes, one of the important factors.</li> <li>o Neutral</li> <li>o Not very important</li> <li>o Not important</li> <li>o Choose not to vote on this question</li> </ul>	

19. Please indicate how much you agree with the following statement: The landscape design of the Trail presented a natural and ecologically healthy environment.
- Strongly disagree
  - Moderately disagree
  - Neutral
  - Moderately agree
  - Strongly agree
20. Please indicate how much you agree with the following statement: The landscape design of the Trail gave expression to nature's Shan-Shui (mountain-water) beauty.
- Strongly disagree
  - Moderately disagree
  - Neutral
  - Moderately agree
  - Strongly agree
21. Please indicate how much you agree with the following statement: I have perceived spiritual implication of Chinese traditional culture while visiting the Trail (e.g., Dragon Lookback, Dragon Back Hill, etc.)
- Strongly disagree
  - Moderately disagree
  - Neutral
  - Moderately agree
  - Strongly agree

<i>[Residents Only]</i>	<i>[Visitors Only]</i>
<p>22. Please indicate how much you agree with the following potential social/economic benefits provided by the Trail: [Scale: Strongly Disagree, Moderately Disagree, Neutral, Moderately Agree, Strongly Agree]:</p> <p>The Trail:</p> <ul style="list-style-type: none"> <li><input type="radio"/> Improves my physical health</li> <li><input type="radio"/> Diversifies my recreation activities</li> <li><input type="radio"/> Increase my social activities</li> <li><input type="radio"/> Improves my quality of life</li> <li><input type="radio"/> Provides environmental education opportunities</li> <li><input type="radio"/> Facilitates social interactions between Huludao and Xingcheng</li> <li><input type="radio"/> Promotes tourism development of Huludao and Xingcheng</li> <li><input type="radio"/> Other (Please specify): _____</li> </ul>	<p>21. Please indicate how much you agree with the following potential social/economic benefits provided by the Trail: [Scale: Strongly Disagree, Moderately Disagree, Neutral, Moderately Agree, Strongly Agree]:</p> <p>The Trail:</p> <ul style="list-style-type: none"> <li><input type="radio"/> Enriches my travel experience</li> <li><input type="radio"/> Improves my understanding about ecological conservation</li> <li><input type="radio"/> Improves citizens' physical health</li> <li><input type="radio"/> Diversifies citizens' recreation activities</li> <li><input type="radio"/> Increase citizens' social activities</li> <li><input type="radio"/> Improves citizens' quality of life</li> <li><input type="radio"/> Improves image of the cities</li> <li><input type="radio"/> Promotes tourism development of Huludao and Xingcheng</li> <li><input type="radio"/> Other (Please specify): _____</li> </ul>

22. Please rate your overall satisfaction toward the design of the Trail (1 = extremely unsatisfied, 5 = extremely satisfied)

23. If you consider that the design of the Trail needs improvement, which deficiencies should the designers address? (Check all that apply)

- Trail design lacks interest.
- The complex routes make wayfinding difficult.
- The Trail gets too crowded at certain locations.
- Accessibility is limited where slopes are too steep.
- Safety hazard exists at certain locations.
- Scenery along the Trail is not stunning enough.
- Transportation is inconvenient to get to the Trail.
- Parking space is limited.
- Deficiency in dining, retail, restrooms and other facilities.
- Deficiency in trash cans.
- Deficiency in seating.
- Deficiency in fitness facilities.
- Trail is poorly maintained.
- Other (please specify): \_\_\_\_\_

24. Please share any other comments you may have about potential improvements that could be made to the Trail to enhance your experience here.

25. Please indicate your gender

- Female
- Male
- Other

26. Please indicate your occupation

- Retiree
- Government official
- Company/firm employee
- Educator/researcher
- Military
- Self-employed
- Student
- laid-off workers
- Other (please specify): \_\_\_\_\_

27. What year were you born?

28. What is your highest level of formal education?

- Junior high school and below
- High school
- Junior College
- University or college bachelor's degree
- Master's degree and above
- Ph.D